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## THE PROGRESS OF THE MEDICAL SERVICE SINCE THE ADVENT OF WAR\*

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BEFORE the onset of this present conflict the R.C.A.M.C. provided medical and dental services to the personnel of the Royal Canadian Navy, Royal Military College, the Active Militia and Royal Canadian Air Force (Permanent and Non-permanent Forces). Medical services were also maintained for personnel of the Non-permanent Active Militia during their annual training at summer camps. Attention was given to training of all ranks, and in this respect three camp schools and thirty-four medical units were authorized to train. A rough estimate of the amount of work carried out in the five-months' period preceding Canada's entry in the war may be gained from statistics, which show that approximately three thousand patients were treated in hospitals.

The shift from a peace to a war time basis has been made without any break in continuity, but, as you can readily imagine, has entailed considerable work commensurate with the necessary expansion of each branch of the Service. To begin with, the pressure of work has greatly taxed the administrative strength of the directorate at National Defence Headquarters, and made it necessary to increase the staff ten-fold. Early at the start medical units were brought up to full strength and trained. The provision for, and the training of, such units had to be carried out while having such personnel inoculated, vaccinated, and documented. At the same time the personnel were utilized in caring for the sick of the various units. This naturally caused considerable detailing and attaching of medical officers within Districts so as to prevent the

taking on of those for Overseas Units earlier than was necessary.

One can readily see the magnitude of the task. In 1939 small military hospitals used largely for the treatment of mildly ill cases were in operation. Of these there were 10 with a total capacity of 372 beds. With the sudden increase in troops consequent upon enlistment arrangements were made with the Department of Pensions and National Health by which the sick might be treated in the D.P. and N.H. and civilian contract hospitals at the discretion of the Department of National Defence.

At the present time there are 72 military hospitals on the Home War Establishment and 2 in Newfoundland, bringing the total capacity to over 5,900 beds. Of these 33 are connected with training centres. There are also 27 hospitals for prisoners of war and internees, of from 10 to 50 beds, with a total capacity of 500 beds.

Overseas there are 3 General Hospitals; a Neurological Hospital; a Casualty Clearing Station and a Convalescent Depot, providing in all some 3,800 beds.

With this marked increase in establishment one can readily understand the great need for medical officers to staff these hospitals. Another difficulty has been the large quantity of equipment, drugs and supplies required on short notice. While these have often been difficult to procure, we are certain that our hospitals are now operating successfully as complete units. It is of interest that the Navy, R.C.A.F., and units of our allies receive their supplies through this Department on repayment.

It might be advisable to mention briefly the number of medical officers and nursing sisters

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ear and mental conditions accounted for over 40 per cent of those discharged for medical reasons after attestation. The standards for the medical examination of recruits in so far as visual acuity and ear conditions were concerned, are high, so that the large number of those found medically unfit is largely the result of a careful re-examination of recruits. The discharge rate from all causes must be considered in the light of the difficult circumstances attending hurried enlistment in large numbers. It is often necessary to depend on civilian practitioners for the examination of recruits. The Service requirements are not always understood by some; examination quarters are often unsuitable; and occasionally medical boards are not well balanced, in that specialists are not available for all.

There is one other important factor to be considered in any discussion involving the welfare of newly enlisted soldiers. The change from a sedentary occupation to the Active Force does much to show up any hitherto disguised disability. This must ever be taken into account, and in many is only discernible after months of active training. For this reason alone it is essential to have frequent re-examinations. A word here about Regimental Medical Officers might not be amiss. They have an extremely important position to fulfil and are directly responsible for the well-being of officers and other ranks comprising their units. It is not sufficient that the medical officer carefully administer to the ill of his unit, but it is his duty to understand and act as an adviser, morally and mentally, as well as physically. He can do much to prevent malingering, and by careful study raise the efficiency and morale of his men to the peak so essential for this conflict.

Early in October, 1939, a Consultants' Branch of the D.G.M.S. Directorate was organized. It is composed of a number of highly qualified medical officers of outstanding ability in their various specialties. The consultants at present employed are in Medicine, Surgery, Hygiene and Radiology. These officers have rendered valuable advice and assistance on questions of a professional and scientific nature. Among the problems studied and regarding which advice has been given are the following: blood-grouping and transfusion; physiotherapy and occupational therapy; facial and plastic surgery; selection of medical equipment and supplies; standards of physical fitness; new methods of treat-

ment; x-ray examinations; psychological tests, etc. The consultants have also formed a valuable connecting link with the National Research Council, the Canadian Medical Association, the Provincial Medical Associations, and various other scientific societies.

Two courses in tropical medicine have been held to date and another is contemplated in the very near future. Two courses for x-ray technicians, one course for laboratory assistants, and a four months' course for radiologists have just been completed. I can assure you that we are doing all within our power to train our personnel along practical lines.

Certain very definite advances have been made, and notable among these is the taking of x-rays of chests of recruits on enlistment and discharge. As stated, 1.6 per cent have been rejected because of chest conditions diagnosed by x-ray on enlistment, but this procedure is believed also to be a valuable one from the standpoint of pensions in later years. Another notable advance has been the development of a combined TAB vaccine with tetanus toxoid. This is now being widely used in Canada for immunizing purposes, and does much to reduce the work of the medical officers. In collaboration with the Connaught Laboratory of the University of Toronto, supplies of concentrated human serum were issued to all medical units of this Department, both in Canada and Overseas. It is of note that during the year a process was developed for the elimination of the blood cells and desiccating the serum from blood donated by the public. Supplies of all dried serum are now available, and have been issued to all medical units in Canada and Overseas. This article can be stored indefinitely, and by the addition of distilled water is readily available for use.

I would like to pause for a moment at this juncture to pay tribute to the older members of the profession. It is indeed gratifying to see how they have come forward and accepted additional responsibility in the community in which they live. The additional burden they are carrying has made possible the release of many younger men for war services. I would also like to pay tribute to the many Nursing Sisters who have volunteered their services.

More medical officers are required at the present time. Replacements and staffing of newly mobilized medical units and Home War Hospitals make it imperative for many more to

offer their services. Some 300 are required by the Services this year and it is estimated that as many, if not more, will be required for 1942.

Recently, authorization was granted for the appointment to the Royal Canadian Army Medical Corps of medical officers who were graduates of the universities of the United States and the British Empire, whose academic standards are such as are acceptable to this Directorate.

I would again like to state that the R.C.A.M.C. is your Corps. It is our profession's contribution to the cause of freedom for which we are all fighting. Personally, I am merely the ad-

ministrative military head of that Corps, and can only be successful as long as I receive the same support of the medical profession that I have enjoyed since occupying the position of Director General of Medical Services, and just as long as the profession shows the same unity and sacrifice that has been evident since the declaration of war.

In closing, let me assure you that when the history of this conflict is written we shall all be proud of the part our profession has taken and the contribution it has made toward the onward march of civilization.

## THE SURGICAL TREATMENT OF GOITRE\*

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THIS presentation is a review of a series of 376 consecutive cases of disease of the thyroid gland in order to portray the relative frequency of the various types of goitre with their different pathological and clinical findings, and with a discussion of the treatment and results. The subject-matter has in a large measure been gathered from the records of patients treated in St. Michael's Hospital during the period from 1931 to 1939.

TABLE I.  
CLINICAL CLASSIFICATION

- |   |
|---|
| 1. Diffuse goitre without hyperthyroidism |
| (a) Juvenile or adolescent goitre         |
| (b) Late diffuse colloid goitre           |
| 2. Nodular goitre without hyperthyroidism |
| (Non-toxic adenoma)                       |
| 3. Diffuse goitre with hyperthyroidism    |
| (Graves' disease)                         |
| 4. Nodular goitre with hyperthyroidism    |
| (Toxic adenoma)                           |
| 5. Inflammations                          |
| (a) Thyroiditis                           |
| (b) Strumitis                             |
| 6. Malignant                              |

The cases are classified according to their clinical and pathological manifestations as toxic diffuse, toxic nodular, non-toxic diffuse and non-toxic nodular goitre. A personal follow-up of late post-operative cases is included.

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### ANÆSTHESIA

The type of anæsthetic should be carefully chosen, since upon this depends in no small measure the avoidance of operative and early post-operative complications. Many surgeons obtain good results with a variety of anæsthetics. Ether is in my opinion undesirable because of the fact that it produces so much nausea and depletion of body fluids. This prevents adequate intake at a time when increased combustion of fuel and water with severe thyroid reactions is liable to occur. Avertin as a basal anæsthetic, supplemented with nitrous oxide gas and oxygen, provides many highly desirable features. The severely toxic patient may be given a small saline enema daily for 2 or 3 days prior to operation, and on the appointed day, with the substitution of avertin, the patient falls asleep in bed. During the operation the patient remains in a quiet peaceful sleep. Respirations are not laboured, since it is possible to administer a gaseous mixture, rich in oxygen and low in nitrous oxide. Cyclopropane produces undesirable oozing, raises the blood pressure, and prolongs the period of unconsciousness. Local anæsthesia with the patient conscious, and unprotected from psychic shock, either with light nitrous oxide or avertin, is in my opinion an unnecessarily trying ordeal for both patient and surgeon. In St. Michael's Hospital I have had the good fortune to be associated with a group of anæsthetists who are especially skilful in the use of

TABLE II.  
TYPE OF ANÆSTHETIC

Type of goitre	Avertin with nitrous oxide and oxygen	Nitrous oxide and oxygen	Ether	Cyclo- propane	Local Novo- cain
Nodular with hyperthyroidism	155	15		2	1
Diffuse with hyperthyroidism	111	4			
Nodular without hyperthyroidism	77	2	1		
Diffuse without hyperthyroidism	8				
Carcinoma.....	1				
Reidel's struma...	1				
Degeneration of thyroid.....	1				
Total.....	354	21	1	2	1

avertin as a basal anæsthetic. During the past eight years I have used avertin with nitrous oxide gas and oxygen in all but two or three cases.

## EXTENT OF OPERATION

In diffuse toxic goitre one removes practically the entire gland, leaving only a thin slice of the posterior capsule of each lobe. There is not sufficient tissue left to permit covering the remnant with thyroid capsule by means of a continuous suture. The recurrent laryngeal nerves are routinely palpated by flicking the back of the operator's finger nail over the nerve, made tense by rolling the gland mesially. By constantly keeping that characteristic web-like layer of loose tissue in immediate contact with the thyroid gland, one minimizes the danger of damage to the recurrent nerves and the parathyroid glands. Meticulous hæmostasis is maintained throughout the operation. The middle and inferior thyroid veins are isolated and tied before cutting. The fascia surrounding the superior pole is incised anteriorly and gently pushed to each side. This manœuvre protects the superior laryngeal nerve. The superior thyroid vessels are ligated and cut, thus freeing the upper pole. A row of hæmostats is applied along the proposed line of section. The gland is incised in a backward and inward direction. Cautious approach to the posterior capsule and vessels enables one to grasp the vessels frequently before sectioning. A change in the texture of the gland as one approaches the posterior capsule is noted. It is at this stage that great care is required in the maintenance of hæmostasis, since

temporary loss of control of the bleeding point along the mesial border of the thyroid remnant may be embarrassing. These vessels are friable, and if, unfortunately, the cut vessel slips out of the forceps it retracts into the tracheo-oesophageal sulcus. The assistant should elevate the handles of the hæmostat sufficiently merely

TABLE III.  
TYPE OF OPERATION

Type of goitre	Sub-total thyroidectomy (percentage)	Hemi-thyroidectomy (percentage)
Nodular with hyperthyroidism.	89	11
Diffuse with hyperthyroidism.	100	
Nodular without hyperthyroidism.	67	33
Diffuse without hyperthyroidism.	100	
Carcinoma.....	100	
Reidel's struma...	100	
Degeneration of thyroid.....	100	

to permit the surgeon to pass the ligature beneath the handles and about the point. Should control of the cut vessel be lost it is unwise to dig deeply into the sulcus between the thyroid remnant and the trachea, lest the recurrent laryngeal nerve be damaged. A better way of grasping the vessel is to pass a small curved hæmostat gently between the remnant and the trachea, and at the same time to roll the remnant inwards. Then, by observing the posterior aspect of the remnant, the recurrent nerve is readily observed and avoided. A second method of dealing with troublesome hæmorrhage is to ligate the inferior thyroid artery proximal to the point at which it branches. The trachea is always laid bare, and all thyroid tissue in the midline, including the pyramidal lobe, is removed. In the nodular toxic goitre and the nodular non-toxic goitre somewhat more gland is left, depending upon the history, severity of the symptoms, and the consistency and vascularity of the gland on exposure.

This operation is a most radical one, and, for lack of a better term, is described as a sub-total thyroidectomy. The remnant of gland frequently consists of nothing more than a small area of posterior gland capsule, the size of one's little finger nail, and not more than one-eighth of an inch thick. There is no mathematical rule to guide one regarding the amount of tissue to be left, experience being by far the best guide.



TABLE IV.  
COMPLICATIONS FOLLOWING THYROIDECTOMY  
IN 376 PATIENTS

1. Immediate:
  - (a) Operative death—one.
  - (b) Air embolism during operation—one.
  - (c) Reactionary hæmorrhage—one.
  - (d) Laryngeal nerve injury—ten.
  - (e) Pulmonary complications—
  - (f) Thyroid crisis—several slight, but none severe or typical.
  - (g) Parathyroid tetany—five.
2. Late:
  - (a) Hypothyroidism—many early transient, few permanent.
  - (b) Recurrent and/or persistent hyperthyroidism—seven, previously operated upon elsewhere.—none following operations in this series.

No. 0 catgut is used exclusively. The use of silk requires a special training for the nurses assisting, and, further, if infection should supervene, then of course the convalescence is greatly prolonged, and the cosmetic result likely very poor.

The operation for nodular goitre, with or without hyperthyroidism, however, is not necessarily sub-total. Both lobes of the thyroid gland are always exposed and carefully palpated. A sub-total removal of the grossly pathological half of the gland is performed. The other lobe, if even moderately enlarged, is similarly treated, leaving a generous remnant. In the nodular goitre without hyperthyroidism the remaining lobe, if normal in size and texture, is not disturbed. This course is followed because it is impossible to exclude the presence of a small adenoma in a uniform, moderate enlargement of the thyroid gland by palpation alone.

#### COMPLICATIONS

1. *Laryngeal nerve injury*.—Ten patients were definitely hoarse for periods varying from 8 days to 3 months. It is our routine procedure to examine the vocal cords both before and after operation. One patient left hospital 11 days after operation suffering from hoarseness and a paralysis of one vocal cord, and has not since been heard from. A second patient left hospital 4 weeks after operation suffering from hoarseness and paralysis of one vocal cord. One year subsequently she returned to the hospital for tonsillectomy, at which time her voice was normal. The remaining eight patients were all examined and found to have normal, or nearly normal function, of the vocal cords at periods varying from one to three months subsequent to operation. In some, however, the voice tired

readily and the patients complained of slight hoarseness at times. I am of the opinion that in this series there has not been a single case of paralysis of the laryngeal nerve or nerves, and that these instances of hoarseness have been due to a stretching of the laryngeal nerve during operation.

2. *Parathyroid tetany*.—There were 5 cases, all commencing within 72 hours of operation. Three were transient and were relieved by intra-

TABLE V.  
END-RESULTS OF THYROIDECTOMY

Type of goitre	Number of cases reporting for follow-up	Group I	Group II	Group III	Group IV
Nodular with hyperthyroidism	114 of 173	52%	40%	2%	6%
Nodular without hyperthyroidism	64 of 80	76%	24%		
Diffuse with hyperthyroidism	98 of 115	60%	29%		11%
Diffuse without hyperthyroidism	8 of 8	83%			17%

Group I—Rehabilitated; no residual symptoms.

Group II—Rehabilitated; some residual symptoms.

Group III—Unimproved.

Group IV—Unsatisfactory.

venous administration of calcium gluconate, combined with a high calcium diet. These transient cases all cleared up in 3 or 4 days and the tetany did not recur. The two cases exhibiting severe signs of parathyroid tetany both occurred in women. One of these, a woman aged 32 years, continued to have carpal spasms in spite of calcium gluconate, viosterol and intramuscular injections of parathormone twice weekly. She was last examined in the follow-up clinic 1 month ago, that is 8 years after operation, and was still suffering from attacks of tetany. The other patient, aged 56 years, had a partial thyroidectomy performed elsewhere prior to coming under my care. At operation the left lobe of the thyroid gland was found intact within its capsule. A sub-total removal of this left lobe was performed. The right side of the neck was exposed, but no tissue removed. She was given a high calcium diet together with intensive treatment with vitamin D. The vitamin D was given in capsule form, each capsule containing 50,000 units. She received two capsules three times a day for 10 days. The blood calcium was raised from 6.5 milligrams to 11.6 milligrams per cent. She improved rather rapidly during this 10-day period and the spasms

TABLE VI.  
GOITRE WITH HYPERTHYROIDISM

	Diffuse (115)	Nodular (173)
Duration in years:		
Maximum.....	25 years	40 years
Minimum.....	2 weeks	4 weeks
Average.....	5.9 years	11.2 years
Sex:		
Female.....	71.4%	87%
Male.....	28.6%	13%
Basal metabolic rate:		
Pre-operative:		
Maximum.....	+85	+58
Minimum.....	+8	
Average.....	+36.8	+25.4
Post-operative:		
Average.....	+5.2	+2.3
Pulse:		
Pre-operative:		
Maximum.....	150	120
Average.....	101	80
Hospitalization:		
Pre-operative:		
Average.....	17.1 days	12.4 days
Maximum.....	57.0 days	150 days
Post-operative:		
Average.....	16.6 days	13.6 days
Maximum.....	33.0 days	35.0 days

disappeared. She has not, at any time subsequently shown any evidence of spasms, but has been kept on a high calcium diet.

3. *Post-operative thyroid crisis.*—There has not been in this series a single case of typical post-operative thyroid crisis. A few patients have had a moderately severe post-operative reaction as evidenced by increased pulse rate and respiratory rate, but none have exhibited the anxious mental state with thrashing about in bed so often seen in thyroid crisis. This freedom from thyroid crisis in this series leads one to conclude that thyroid crisis is the result of three factors: (1) improper pre-operative care, with operation time badly chosen; (2) a poorly administered anæsthetic, or an improper anæsthetic; (3) a poor surgical technique, and the leaving of too much thyroid gland. Possibly the leaving of too much thyroid gland is most likely the cause of thyroid crisis. The remnant must undoubtedly, like the patient, be thrust into the state of hyperactivity and hyperexcitability during the immediate post-operative period, but if most of the gland be removed then a sufficiency of thyroxin to cause the crisis is not produced.

4. *Reactionary hæmorrhage.*—This occurred in one instance. About five hours after operation the patient became cyanosed and dyspnoic, and

on inspection of the neck a huge generalized swelling was observed. The patient was immediately given a hypodermic of morphine, and in the inclined position was taken at once to the operating theatre. The incision was opened and the clot evacuated. On the right side of the neck, along the mesial border of the thyroid remnant, a blood vessel was caught and ligatured. The wound was packed loosely, and the patient returned to bed. A blood transfusion was immediately administered. The subsequent post-operative history was uneventful.

5. *Air embolism.*—This occurred once. While incising the cervical fascia at the lower portion of the operative wound a large vein connecting the anterior jugular veins was severed in the space of Burns. Immediately one heard a sucking sound and within a few seconds a swishing sound over the precordium was clearly audible. This swishing sound was detected before the anæsthetist observed any change in the patient. Presently, however, the blood pressure dropped suddenly to 100 mm. of mercury, and the pulse rose rapidly to 130 beats per minute. This anxious period lasted a few minutes, and gradually the condition of the patient became normal. The operation was completed and the patient made a satisfactory recovery.

6. *Operative death.*—The only death in this series occurred a few minutes subsequent to the completion of the operation. This was a case of nodular goitre with hyperthyroidism. The patient, a female aged 26, had, in addition to her thyroid condition, a congenital absence of the symphysis pubis with a common cloacal opening into which opened the rectum, vagina, and ureters. The death of this patient was sudden. Her condition throughout the operation had apparently been satisfactory. Suddenly she became ashen-grey in colour, her blood pressure dropped rapidly, the pulse became weak and thready, and she died within a few minutes. A post-mortem was not obtained. Death was thought to have been due to cardiac failure. The mortality rate, therefore, in this entire series of 376 cases has been 0.26 per cent. There were no further deaths either in hospital or during the period whilst patients were attending at the follow-up clinic. One patient suffering from diffuse goitre with hyperthyroidism, complicated with diabetes, died two months after discharge from hospital. She had not returned to the follow-up clinic, and only recently, a letter from a relative, in answer to a questionnaire, con-

tained the information that the patient had made a complete recovery from the thyroidectomy, but unfortunately had died of diabetes. This case has not been considered a death as a result of thyroidectomy.

TABLE VII.

RECENT RE-EXAMINATION OF SEVENTY-FIVE PATIENTS  
3 TO 9 YEARS  
AFTER SUB-TOTAL THYROIDECTOMY

	<i>Nodular with hyperthyroidism (44)</i>	<i>Diffuse with hyperthyroidism (31)</i>
Time since operation:		
Maximum.....	7 years	9 years
Minimum.....	3 years	3 years
Average.....	5.1 years	5.5 years
Gain in weight:		
3 months after operation	8.3 lbs.	11.2 lbs.
6 months after operation	10.7 lbs.	15.4 lbs.
1 year after operation	14.8 lbs.	16.8 lbs.
Present weight.....	17.6 lbs.	21.2 lbs.
Percentage patients hypothyroid:		
At present.....	10	3
Percentage patients with palpable nodule:		
At present.....	10	3
Percentage dry skin....	10	..
Pulse:		
Pre-operative.....	92.6	104.3
Now.....	75.5	72.4

7. *Post-operative hypothyroidism.*—The type of radical thyroidectomy advocated in this paper will result in a high incidence of temporary hypothyroidism. In fact, this is hoped for, for it definitely insures against a return of thyrotoxicosis. Gradually patients are relieved of this complication, which exists for a period varying from several weeks to a year or more. The period of hypothyroidism causes some discomfort and can best be treated by the administration of thyroid extract, about 1 grain daily. One patient, aged 45 years, was operated upon four years ago and was obliged to take thyroid extract more or less constantly until about four months ago. Since then, she has not required any thyroid extract.

8. *Recurring and persistent hyperthyroidism.*—In this series there were 7 patients who presented themselves with signs and symptoms of hyperthyroidism, and upon whom, previously, a thyroidectomy had been performed elsewhere. In all of these patients a sub-total thyroidectomy was performed. They have all made a satisfactory recovery and have remained free of

manifestations of hyperthyroidism after a period of from 3 to 6 years. In all of these patients an examination of the gland at operation leads one to conclude that, in this short series at least, the persistence of hyperthyroidism was due to failure to remove sufficient thyroid tissue at the first operation. In my own series, as far as I know, there have not been any cases of recurring or persistent hyperthyroidism. It is only fair to state that in the entire list of patients prior to those included in this review I had one case of persistent hyperthyroidism. This patient, aged 32, returned one year subsequent to the date of my first operation. She had returned to the country and engaged in strenuous work about her home within a few weeks of her operation. She was improved for only a short time, and then all the signs and symptoms became aggravated. At the second operation, masses of thyroid tissue were removed which were so large as to convince me that the first operation had been inadequate.

#### RESULTS OF SUB-TOTAL THYROIDECTOMY

It is very difficult to assess accurately the results of operation. All patients upon leaving hospital are instructed to return for a follow-up examination. About 30 per cent of all cases have not been traced since leaving hospital; 70 per cent of all cases have either presented themselves at the follow-up clinic a sufficient number of times or have returned on request for a complete examination.

It has appeared fair to divide the late results into 4 groups—groups I, II, III, IV. Groups I and II include all patients who have been rehabilitated. In group I are placed the patients who have made a complete recovery from all signs and symptoms, and have returned to their former occupations, having no disability whatsoever. Group II includes those cases which, while making a good recovery and returning to their former occupations, still suffer from some symptom such as fatigability, dyspnoea, palpitation under stress, and so forth. They carry on quite well if they do not exert themselves too much. They have not sufficient reserve, however, to undertake heavy work, such as scrubbing, or polishing floors, without feeling the effects. Group III includes cases not improved. Group IV includes those cases which are definitely unsatisfactory. This last group includes those patients who have died, either immediately or later, following operation; cases of persistent



hypothyroidism; tetany; or neuro-circulatory asthenia; and finally the generally unsatisfactory patient. In the nodular group with hyperthyroidism 52 per cent fall into group I; 40 per cent into group II; 2 per cent into group III; and 6 per cent into group IV. Of the nodular group without hyperthyroidism 76 per cent are placed in group I and the remaining 24 per cent in group II. In the group of diffuse goitres with hyperthyroidism 60 per cent made a very satisfactory recovery; 29 per cent a fairly satisfactory recovery; and 11 per cent were unsatisfactory. A small series comprising 8 cases of diffuse goitre without hyperthyroidism is really too small to enable one to draw any conclusions. Therefore, of the total of 212 patients suffering from hyperthyroidism, either nodular or diffuse, 90 per cent were rehabilitated and 10 per cent unsatisfactory.

Recently a re-examination of 75 patients, 3 to 9 years after sub-total thyroidectomy for

toxic goitre, has been undertaken for the purpose of determining the present level of metabolism. Many of these are private patients, and quite a number had come from out of town. It was not possible to perform a metabolism test on a sufficient portion to be of any value. One metabolism estimation, of course, would not in itself provide much information. These patients had all been personally followed since operation. A careful follow-up included the recording of change in weight, pulse and general condition. Quite a number were definitely hypothyroid following operation. About 10 per cent of the nodular toxic patients and 3 per cent of the diffuse toxic patients are at present hypothyroid, as indicated by dryness of the skin, slow pulse, or other sign. About 10 per cent of the nodular toxic patients also exhibited evidence of a nodule, presumably due to hypertrophy of the thyroid remnant, but not all of these patients are hypothyroid.

#### AVERTIN-NITROUS OXIDE ANÆSTHESIA IN THYROIDECTOMY\*

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IN thyroid surgery the administration of the anæsthetic presents certain difficulties not commonly met with in other procedures. These problems are inherent in the operation itself and the disease it seeks to cure. Therefore the question of anæsthesia should receive more than passing thought by both surgeon and anæsthetist, in order that the patient may obtain the maximum benefit not only on the table but during the equally important post-operative period. The woman with thyrotoxicosis is essentially a medical case who must undergo a surgical interlude. The anæsthetist has the double responsibility of choosing an anæsthetic which will allow the surgeon to complete a useful operation without adding further strain to a heart or nervous system already over-taxed by organic changes. It is significant that, in reports from recognized thyroid centres, great stress is laid on the fact that good surgery cannot neutralize the effects of mediocre anæsthesia. It behooves the anæsthetist, then, to

concentrate on the specific work in hand, possibly introducing techniques which he may consider unnecessary in other operations but which may be of invaluable assistance in thyroidectomy. Such an aid has been found in avertin as a preliminary to nitrous oxide, the benefits of which combination are outlined in this presentation.

The perfect anæsthetic—if it is ever found—will afford the goitre patient certain safeguards. It will be pleasant to take and will do nothing to heighten nervous tension. It will be harmless to metabolism and without stimulating effect on the diseased gland. It will cause no damage to the myocardium nor will it increase bleeding. It will produce good relaxation for the removal of even a large, substernal gland without infringement on the oxygen intake. It will be non-irritating to the bronchial tree and will not cause excessive secretion of mucus. It will be followed by a post-operative period of rest without vomiting or acidosis. No one drug or technique can be expected to provide all of these advantages to all patients but avertin with nitrous oxide and oxygen at least approaches

\* Presented before the combined Sections of Surgery and Anæsthesia, Academy of Medicine, Toronto, March 18, 1941.

this ideal. This is not a condemnation of other methods. Instead, it is a suggestion for the more widespread adoption of one very satisfactory way of handling a difficult anaesthetic problem.

Avertin has been used at St. Michael's Hospital, Toronto, since 1931, not as a routine but as a desirable form of anaesthesia in specific types of surgery. Since it is difficult to correlate the observations of different workers, the truest picture of any drug can be obtained by limiting an analysis to a small group of unselected cases in which very accurate records have been kept. This series, therefore, represents 110 consecutive cases in which Dr. H. G. Armstrong performed the entire operation and the author personally administered the anaesthetic throughout. It brings up to date a similar series published in 1935<sup>1</sup> and includes 60 cases covered at that time. Its importance lies, not in the total number, but in the fact that a series by the same surgeon and same anaesthetist offers an unusual opportunity of appraising avertin itself, since standardization of technique has eliminated practically all factors of variation except those directly attributable to the patient or the drug.

Avertin is not an anaesthetic but a sedative, an extremely strong sedative, but one which, nevertheless, must be reinforced by some inhalation agent. This is predicated on the assumption that the surgeon desires a general anaesthetic. The enthusiast for local anaesthesia may find this technique a useful alternative to his favourite method in certain difficult cases. In choosing the inhalation anaesthetic it is of great importance to avoid ether. Ether is universally condemned by thyroid authorities since it is definitely stimulating to the toxic gland and may contribute to post-operative "storm". Its irritating qualities may lead to increased bronchial secretions during and after operation, thus predisposing to hoarseness, tracheitis or pneumonic changes associated with plugs of mucus. The slow excretion and almost invariable vomiting robs the patient of needed rest in the most critical 24 hours and may even lead to acidosis. These features which may be only an annoyance in a simple operation are actually dangerous in thyroidectomy. In ether's favour is the relative ease of administration and the fact that it produces good relaxation with little or no damage to the myocardium if an ample intake of oxygen is maintained. A much more favourable picture is presented by cyclopropane, which is pleasant to take but requires special training in

administration to be even reasonably safe. It may increase bleeding, in this particular field, to the point of prolonging the operation. Relaxation is usually good but frequently it can only be obtained by pushing the gas to a point at which irregularities in the pulse appear—changes which are no longer considered as harmless as was at first thought. Certainly, cases of prolonged and deep cyclopropane anaesthesia have been followed by obvious myocardial collapse and its use in the presence of a toxic heart is open to question. Neither is the post-operative period entirely free from vomiting. Nevertheless, cyclopropane is coming into widespread use because, when complications do not arise the whole procedure is so satisfactory that there is considerable justification for overlooking the occasional poor result.

The remaining agent commonly available is nitrous oxide, a drug which meets most of the specifications of the perfect anaesthetic when it is possible to administer it with adequate amounts of oxygen. The proviso about oxygen is of the utmost importance, because the dangers and difficulties with nitrous oxide have always been associated with a lack of oxygen rather than with an excess of the gas, which is, in itself, essentially harmless. Surprisingly large amounts of oxygen can be given, without sacrificing the anaesthetic effect of the nitrous oxide, when it is preceded by avertin. The combination of the two gave ideal conditions in 90 per cent of these cases. In no instance was a single drop of ether added. Results could be most accurately appraised when using the old type machine which supplied the gases under pressure because the actual percentage of oxygen being given, from moment to moment, was registered. In four-fifths of all such administrations, induction was possible with 20 per cent oxygen—the equal of air. The oxygen was progressively increased until signs of lightness occurred, usually at a point between 50 and 70 per cent oxygen. Anaesthesia was then stabilized at a slightly lower level: in two-thirds of the cases, satisfactory working conditions were maintained for periods of from 15 to 40 minutes with 60 per cent oxygen. In only 7 cases was it necessary to reduce the oxygen below 35 per cent, after the initial induction. Somewhat less spectacular results were obtained in the latter part of the series, using the new carbon dioxide absorption technique. Eleven of these patients showed some coughing or straining for short periods, usually



during enucleation of a large gland. Since cyclopropane was always available on these machines, small amounts—500 to 2,500 c.c.—were added in 8 of these difficult cases. This prevented any cyanosis due to the reflex spasm of light anaesthesia, without exposing the patient to the disadvantages of full cyclopropane dosage. In all cases, the blood pressure fell 15 or 20 points during the onset of sleep, with little change in pulse. This fall must have been respiratory in origin since any stimulation to deeper breathing caused a rise. In only 4 cases did the pressure fail to improve with the fuller respirations accompanying the start of the gas: many rose above the pre-operative level. During operation the greatest falls were 100 points in 1 case, 50 in 4, 40 in 3, and 30 in 15. Against these there was an actual rise of from 5 to 30 points, during the main operation in 6 cases. The remaining patients showed falls of 20 points or less and in the entire series all except 8 finished with a systolic pressure within 25 points of the pre-anaesthetic level. In only 1 was support of the circulation by intravenous fluids or drugs required, although each received intravenous glucose immediately on return to bed.

Altogether, 90 per cent of the entire group were maintained on nitrous oxide with comfort to the anaesthetist and safety to the patient. In the remaining relatively unsatisfactory administrations occurred the only 6 complications, all except 1 in extremely toxic patients with advanced myocardial changes. In 2 cases alarming heart symptoms persisted for 48 hours: one had great obstruction to breathing at all times, due to a permanent deformity of the cervical vertebrae: the other expelled most of the avertin—a rare occurrence—and so had poor relaxation, not because of the avertin but due to its lack. Two patients developed pulmonary complications: one showed a mild congestion for less than 24 hours, following a drop in blood pressure of 60 points during operation; the other had a frank bronchopneumonia for 3 days, after unsatisfactory anaesthesia for the removal of a very large substernal gland. Two patients showed profound cardiac collapse: in one it occurred at the end of a very difficult dissection in a woman with uncontrollable fibrillation: in the other, it developed, without warning or apparent cause, at the end of 20 minutes of uneventful anaesthesia without haemorrhage or respiratory interference. None of these complications unduly prolonged convalescence.

This record was obtained in a strictly unselected group, in which the thyroid symptoms were accompanied by many types of heart lesions (in 37 of which there were electrocardiographic changes), latent tuberculosis, chronic bronchitis, bronchiectasis, diabetes, pregnancy, paralysis of one vocal cord, syphilis of the central nervous system and menopausal upsets. One patient was insane and one deaf and dumb: in these, the smooth onset of sleep in bed was particularly beneficial. Females predominated by 4 to 1. The youngest was 15: the oldest 68: more than half were between 20 and 40.

Difficulty in swallowing or breathing was a complaint of 37 patients, 24 of whom also showed toxic signs. In such cases, the large amount of oxygen available with avertin was a safeguard against the dangers accompanying obstruction of the airway. It was not always possible for the surgeon to avoid momentarily interfering with inspiration, but, with the high oxygen concentration, the intake while restricted in volume was at no time deficient in oxygen content. The ever-present danger of obstruction may be due to the size of the gland, its retrosternal position, the difficulty of its removal without excessive manipulation, reflex spasm due to irritation of the recurrent laryngeal nerve or collapse of the weakened tracheal rings. Acute obstruction, when present, demands the use of an intratracheal catheter. In this series it was not considered necessary but, in every case, a complete set of catheters, laryngoscope, etc., was available for instant use in the event of an alarming collapse. This is probably a better procedure than the routine introduction of a catheter in every case. Maintenance of intratracheal anaesthesia may require a deeper plane than is necessary for the performance of the actual operation. If the proper level is not obtained the intubation may be difficult or impossible and subsequent coughing or straining, caused by failure to abolish the laryngeal or tracheal reflexes, may result in anoxaemia quite as harmful as that due to external pressure. With deeper anaesthesia these signs are replaced by the calm breathing and full oxygenation which has been responsible for the widespread adoption of the intratracheal method in many fields. However, it does not seem altogether advisable to subject every thyroid heart to the added strain of deep anaesthesia in order to avoid the hypothetical danger of obstruction. To obtain a suitable plane, the avertin must be increased beyond the accepted



dose of 100 mg. per kilo of body weight or the nitrous oxide strengthened by the addition of cyclopropane. Probably the best system is to insert an intratracheal catheter in any case of excessively large or retrosternal gland. Better results might have followed its use in at least two of these patients. Possibly the case of bronchopneumonia would have been prevented had a catheter been in place to serve as an avenue for the aspiration of collected mucus, the secretion of which is actually diminished, rather than increased, with the intratracheal method.

To consistently attain these results the full dose of 100 mg. per kilo of body weight must be given. Just as the thyroid patient tolerates abnormal doses of any ordinary sedative, so she requires large amounts of avertin. The majority of patients were toxic and so did well with the full dose: the others were of the obstructive type and so needed the maximum avertin effect to permit the use of adequate oxygen. All except 6 received 100 mg.: only 1 was unnecessarily deep. In 2 very toxic patients, 110 and 120 mg. were given, after careful consideration. Doses of less than 100 mg. were reserved for 2 obese patients and 2 who had received morphine. Morphine has no logical place with avertin despite the fact that much of the literature advocates its use. Avertin by itself, in properly selected amounts, will produce any desired effect. In thyroidectomy, 100 mg. alone will give far more constant results than will a small dose reinforced with morphine. Morphine merely adds to the respiratory depression without ma-

terially improving operating conditions. The indiscriminate combining of these depressants is responsible for much of the unwarranted criticism of avertin. In such instances, the anaesthetist, to avoid alarming depression, is forced to reduce the avertin to an inadequate level and the effect is no better than would have been obtained with simpler sedatives. Particularly is this the case where insufficient time is allowed for it to act. Best results were obtained when the injection was completed 30 minutes before the start of the operation. The patient was left undisturbed for at least 25 minutes and then moved to the table, as quietly as possible. In most cases she was, by then, in a moderately deep sleep and the anaesthetic was started prior to the preparation of the skin. Even rigid operating schedules were quite well maintained by planning the injection for one-half hour before the time of the incision.

The delay was occasionally an inconvenience but any additional work involved was apparent rather than real. The subsequent course of the inhalation anaesthesia was so simplified that in almost all cases the anaesthetist felt amply repaid for the extra time consumed. When to this was added the satisfaction of the surgeon and the invariable enthusiasm of the patient, the net balance was considered to favour very strongly the combination of avertin, nitrous oxide and oxygen.

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## PSYCHOLOGICAL MEDICINE IN MODERN PRACTICE\*

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### INTRODUCTION

THE psychological aspects of modern medical practice are diverse and in a paper such as this discussion might range over such a wide area that no useful purpose would be served. Accordingly, it is proposed to select for consideration a type of problem which is the direct and immediate concern of physicians in general practice. It is *not* proposed to discuss those problems which arise in connection with the treatment of persons suffering from frank mental

disorder and which may properly be assigned to the specialized field of psychiatry; it is proposed to direct attention to a type of patient, familiar to every practising physician, who is physically ill but whose illness appears to have no adequate organic basis. Such patients are easy to label but it must be admitted that the label seldom does much to help either the physician or the patient. Our failure to find any good, sound, obvious physical reason for the patient's symptoms is naturally annoying. But when he per-versely continues to be sick even after we have assured him that there is "nothing wrong" with

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him, it becomes downright exasperating. It is perhaps small wonder that, on occasion, we then resort to a kind of diagnostic "name-calling".

During the last war men who developed functional physical disabilities in the absence of adequate organic cause were, at first, diagnosed (condemned) as "malingerers". When it was realized that this was in most cases contrary to the facts, the diagnosis of "shell shock" became popular, implying, as it did, that these conditions were somehow caused by concussion. The frequent occurrence of such functional illnesses in men who had never been exposed to actual warfare quickly made this theory untenable. Since that time the relatively innocuous term "psychoneurosis" has become popular and seems to have been sufficiently vague to serve as a convenient way of dismissing these patients from further serious consideration. It must be admitted, however, that the labels applied to these or any other patients have, in themselves, little therapeutic value. Indeed, it might be better if we talked less about labels and more about people. For example:

Last June, in one of the industrial cities of Western Ontario, a middle-aged factory worker presented himself for examination at the provincial Mental Health Clinic serving that area.\* This man had been referred by his physician who had previously described to the clinic psychiatrist a history of somatic complaints, for which no adequate physical basis could be found but by which the man was rapidly becoming almost totally incapacitated. These complaints included severe headache, excessive fatigability, loss of appetite and persistent intestinal distress.

During the initial interview with this patient, it was learned that he had been employed in a furniture factory since 1926. Until 1938, his record had been excellent. At this time the factory had been reorganized and the previous system of pay-by-the-hour had been replaced by a piece-work incentive system. Shortly after this change had been made the patient began to suffer from frequent headaches and noticed that he tired very easily at work. Later he developed a skin infection on his forehead, nose and fingers. Thereafter, his intestinal symptoms became troublesome and he began to lose weight. Although he managed to hold his job, he was away from work a good deal and felt that, even when working, he was not able to keep up to the required production standards. He stated that the foreman had to speak to him frequently and he seemed very uncertain of his ability to hold his position much longer.

Following this interview an investigation was made of the patient's actual status at the factory. It was found that his employers were, and always had been, entirely satisfied with his work. He was described as a conscientious and dependable worker and, although it was evident that poor health had interfered somewhat with his efficiency in recent months, there was certainly no thought of dispensing with his services. Accordingly, in subsequent interviews with the patient, the clinic psychiatrist undertook not only to reassure

him concerning the security of his position, but to help him to see how his apparently physical symptoms had developed out of a background of inadequate adjustment to new conditions of work.

During the course of the next few weeks his symptoms became gradually less frequent and less severe. At the present time he is working every day. He still reports occasional intestinal distress before going to work in the morning, but his headaches and fatigability have entirely disappeared. His appetite has shown marked improvement. He looks well and states that he feels well, both of which are in marked contrast to his previous condition. His production record at the factory has shown steady improvement.

The case of this factory worker has been described in some detail because he is the type of patient with which this paper is concerned. Label him as you will, he was a sick man. Furthermore, he was suffering from a variety of specific somatic complaints which very nearly incapacitated him as a productive worker. The most intensive medical examination failed to reveal any adequate organic basis for these complaints. That there *was* no organic basis for them is indicated by his almost complete recovery under a type of treatment which took full account of the fact that, beyond being a physiological organism, he was also a human being.

#### INCIDENCE IN GENERAL PRACTICE

How frequently does the average practising physician encounter patients of this type—patients whose apparently physical complaints are functional rather than organic in origin and whose effective treatment calls for psychological rather than purely physiological insight? The answer to this question seems to be that, whether he knows it or not, more than one-third of all the patients who consult him are suffering from illnesses of this kind. The evidence upon which such a statement is based, is to be found in studies such as the following.

Dr. G. Canby Robinson, an internist and eminent hospital administrator, made a study of 174 unselected cases seeking treatment in the in-patient and out-patient medical services of the Johns Hopkins Hospital. He found that, in 36 per cent of these unselected cases, the illnesses were due primarily to emotional and situational factors.

Dr. Franklin McLean, a pathologist and internist, studied 100 unselected records from the Medical Clinic at the University of Chicago. He concluded that emotional or other psychological factors were solely responsible for the illness in 27 per cent of these cases, and were largely responsible for the illness in a further 23 per cent.

\* For information concerning this and following illustrative cases, I am indebted to the Directors of Ontario Mental Health Clinics.



Dr. J. R. Blalock, in a similar study reported in the Virginia Medical Monographs (1939), states that one-third of the patients coming to the attention of a practising physician present no primary physical disease.

In another survey reported in 1939 Dr. Louis Hamman, of Baltimore, reviewed a series of 500 patients from his own private practice. It is important to note that Dr. Hamman is known as an internist and disclaims any particular interest or talent in the field of psychiatry. Not a single one of these 500 patients consulted him because of any overt psychiatric problem. Yet he found that in 23 per cent of these cases there was no discoverable organic cause for the symptoms of which they complained. There was an additional 11 per cent of the cases in which the minor organic lesions found could not possibly be adequate to explain the symptoms. From this he concludes that one-third of the patients who consult a physician in general practice are suffering from illnesses which are solely or predominantly functional.

It seems evident that the incidence of functional illness in general practice is such that these patients cannot possibly be referred for the attention of a psychiatric specialist. Only a few of the more extreme cases can or should be so referred. On the other hand, it is equally evident that the physician in general practice cannot afford to ignore one-third of the people who come to him for help. Nor can he afford to dismiss them with a shrug when, after careful medical examination, he finds nothing organically wrong with them. The plain fact is, of course, that every practising physician, whether he be in the community, in a hospital, in an industry, or in the army, is meeting and dealing somehow with these problems every day. That he deal with them intelligently and effectively is important for him as well as for his patients.

#### PSYCHOTHERAPY

Rather than discuss the treatment of functional illnesses in terms of vague exhortations it is proposed here simply to illustrate a few specific propositions concerning psychotherapy. In doing so, it should be understood that the cases described have been deliberately chosen because they have the following characteristics in common. (1) Initially, they all presented a picture of more or less severe physical illness. (2) Despite the most careful medical study no adequate physical basis could be found for their

illness, and, (3) they all showed a favourable response under psychotherapy. (This feature is necessary to ensure that the illness was actually functional. It is not intended to suggest that psychotherapeutic efforts are always uniformly successful).

*I. Psychotherapy can be effective even in cases of severe, long-standing disability.*—One year ago, a 45 year-old man was admitted to a general hospital in one of our larger cities. The history showed that 5 years previously, while undergoing a course of anti-luetic treatment, he had developed a complete paralysis of the legs. He had thereupon been admitted to a hospital for incurables where he had remained bed-ridden ever since. His transfer to general hospital was occasioned by the development of severe pains in the back which were thought to be an exacerbation of his supposedly neurological condition. But here the examining neuro-psychiatrist could find no adequate grounds for the paralysis and undertook intensive psychotherapy. As a result of re-assurance and re-education in five months the patient had learned to walk with great difficulty. Thereafter, improvement was slow but steady. In nine months this man was transformed from the apparently incurable, bedridden cripple he had seemed for five years, into an active, optimistic, employable individual.

*II. In less severe cases psychotherapy need be neither long-continued nor very profound in order to produce favourable results.*—Mrs. H.K. was referred for examination to one of our travelling Mental Health Clinics by her physician. She complained of extreme weakness, becoming easily tired at her work, pains in the sacral and pelvic regions, severe headaches, palpitation, and a fear of developing paralysis in the region of the shoulders. Her physician could find no physical basis for these complaints and felt that the problem was primarily psychological or possibly psychiatric.

Enquiry into the patient's history showed that she had always been emotionally unstable, even as a child, and that her attitude toward injury and illness had always been unhealthy. She had had a difficult pregnancy four years prior to this examination and although anxious to have another child, was very much afraid of going through this ordeal again. It was of special interest to note that both her mother and her sister had died at childbirth. Her sex relations with her husband were unsatisfactory from her standpoint.

It was felt that the patient's many physical complaints were closely related to her inadequate sex adjustment, with its associated marital discord, and also to the conflict between her desire for, and intense fear of, another pregnancy. Accordingly, the psychotherapeutic measures undertaken included discussion of sex problems with both the patient and her husband, with a view to reducing marital disharmony. The efforts of the clinic physician in this direction were admirably supported by the family physician and the patient's condition showed rapid improvement. She has been able to go through another pregnancy and not only has her mental outlook improved but her various physical complaints have disappeared.

*III. Functional difficulties are often treated as though they were organic—with unfortunate results.*—The history in this case showed that the patient had been a semi-invalid for a period of 10 years, during which time she had remained at home doing nothing. She had consulted a number of physicians who had at various times diagnosed: "thyroid toxicity"; "run down condition"; and "poison in the system". The patient had consumed a large amount and variety of medicines in an effort to get relief for her symptoms.

Her earlier history revealed that while training to become a nurse she had developed a variety of neurotic



complaints. These were not recognized as such and she had been advised to give up her training and take a prolonged rest. She was given to understand that her physical condition was such as to preclude success as a nurse. In this case failure to recognize the psychogenic origin of her symptoms resulted in a long period of invalidism during which she developed the idea that she had stomach trouble, gall-bladder disease and a variety of other disabilities.

Treatment in this case began with a thorough and exhaustive medical study of her physical condition, following which she was given emphatic reassurance as to her health. She was then encouraged to undertake a business course, during which she was seen frequently for discussion and reassurance. She was able to demonstrate to herself that she was well, and at the conclusion of her course obtained a position in a local office where she has now been actively engaged for more than three years. At the present time she is well and happy.

IV. *In most cases, functional illnesses do not need the attention of a psychiatric specialist. They can be, and are being, treated effectively by many physicians in general practice.*—An internist in one of our larger medical clinics recently was consulted by a mother who wished him to examine her 17 year old son because he was "tired all the time". On being asked how she knew he was tired, she said that he came home from school and went directly to his room to lie down. On further questioning, she said that he did not enter into the conversation at meal time. Recently she had found the medals he had won with his violin playing, in the wastepaper basket.

When examined the boy was found to be polite and co-operative but he wore a very solemn expression. His blood pressure was found to be 150 and he was obviously very tense. In conversation, he at first refused to answer questions about how he felt. Then he broke down and said that he felt on edge all the time and could not relax.

Medical examination failed to disclose any physical basis for the pronounced symptoms displayed. During a second friendly chat with the boy, however, the internist discovered that he had a brother a year older than himself with whom he was in constant contact both in and out of school. The brother was a happy, carefree boy who was very popular but who adopted a superior and patronizing attitude toward the patient. Over a long period of time this had given rise to a difficult problem of emotional adjustment and it became evident that the boy needed an opportunity to talk over his difficulties with a mature, impartial adviser. Having done so with the internist, the boy was able to deal with his problem successfully and the symptoms described above subsided within four days of the second interview. It seems certain that mishandling in this case might easily have produced a (pseudo) cardiac invalid. As it was a little intelligent psychotherapy resulted in rapid recovery.

In the foregoing remarks, an effort has been made to indicate that:

1. The sick person whose illness has no adequate physical basis is not really helped by being labelled a "psychoneurotic" or by being told that he "just thinks" he is sick.

2. If patients of this type make up one-third of the average general practice it is obviously important that the practising physician know how to deal with them effectively.

3. Even in cases of very extreme functional disability, skilful psychotherapy has been found to be strikingly effective.

4. In less severe cases psychotherapy need be neither very profound nor very prolonged in order to produce favourable results.

5. Functional illnesses are sometimes treated as though they were organic—with no benefit and often some harm to the patients concerned.

6. In many cases of functional illness, physicians who lay no claim to any special knowledge of psychiatry, but who are alert to the occurrence of such cases in their practice, can and do obtain strikingly favourable results from the use of informal psychotherapy at relatively little cost in terms of time or effort.

#### DISCUSSION

In making these observations it is not intended to suggest that the treatment of functional illness is always either a simple or an easy matter. That patients in whom functional disabilities have been permitted to become chronic are often unresponsive to treatment and take up a great deal of the physician's time with little apparent result no one will deny. It is worth noting, however, that even these persistent "disease hunters" and self-appointed "invalids" would be wasting less of the physician's time now if they had been more intelligently treated at an earlier stage when the habit of trying to solve their emotional problems by getting sick was not so firmly ingrained.

It is unfortunate that failure to get results with a few of the more obvious and extreme forms of psychoneurosis has so discouraged many physicians that they simply try to get rid as quickly as possible of any patient who has no gross lesion sufficient to justify his complaints. This tendency to avoid or ignore all cases of functional illness has been further exaggerated by two additional factors: (1) the peculiar isolation of psychiatrists behind the walls of their own specialty; and (2) the serious inadequacy of the training afforded by medical schools in respect to the treatment of non-organic illness.

1. *Isolation of psychiatrists.*—In Ontario during the past ten years we have been making a strenuous effort to bring the psychiatrist out of his institutional shell, and believe that we have made considerable progress in this direction. Prior to that time, in Ontario as elsewhere, nearly all psychiatrists (except for a few practising in large cities) were employed in mental hospitals and, accordingly, were almost exclu-

sively concerned with the care and treatment of psychotic patients. In 1930 the provincial Department of Health organized and put into operation a team of six travelling Mental Health Clinics. Operating from centres in certain of our Mental Hospitals and serving the surrounding area, these clinics have provided a regular advisory service in more than 150 centres (cities, towns and villages) throughout the entire province. Each clinic was placed in charge of a specially trained psychiatrist whose major personal responsibility was to provide a psychiatric consultation service to the medical profession in his district. Thus we have had for some time now a field staff carrying out into the community a modern viewpoint in respect to the early treatment of mental illness and, no less important, bringing back to the Mental Hospital an awareness of mental health problems as they exist in the community.

The two-way effect of this liaison between psychiatry as a specialty and the general practice of medicine has been very apparent. On the one hand, the Mental Hospital has adopted a very much broader view of its responsibility for the prevention as well as the treatment of mental illness; on the other hand, the extent to which an informed medical profession has been ready to take full advantage of such a consultation service has been impressive. One evidence of this is the fact that, whereas in 1931, 16 per cent of the cases examined by the clinics were referred directly by physicians, in 1940 nearly 50 per cent were referred by physicians. It would be incorrect to suppose, furthermore, that this willingness to co-operate on the part of the medical profession takes the form simply of an eagerness to be rid of responsibility for treatment in these cases. The main responsi-

bility in treatment continues to rest, as it always must rest, on the shoulders of the practising physician. All that the psychiatrist can hope to do, on the basis of his special training and experience, is to serve as consultant and adviser.

2. *Inadequacy of medical education.*—More difficult to deal with and more serious in the long run than the isolation of psychiatric specialists is the continuing inadequacy of the training provided for future practising physicians in respect to the treatment of non-organic illness. It must be admitted that as long as the formal psychiatric training of the medical student is confined, as it usually is, to a consideration of the differential diagnosis of certifiable cases of mental disease, he will remain largely unprepared to deal adequately with that 30 per cent of his future patients who will be suffering from illnesses which are primarily functional.

Following a comprehensive survey of the medical schools on this continent, Dr. F. G. Ebaugh reported in 1934 that psychiatric training was entirely inadequate in 85 per cent. Further, he found that, even in the Grade A medical schools, 42 per cent provided no training whatever in clinical psychiatry. More serious than this deficiency in undergraduate medical training, however, was the discovery that of 6,204 post-graduate medical interns 80 per cent received no experience in a psychiatric service.

It seems fair to conclude that in the interests of the physician in general practice, as well as in the interests of a large number of his patients, more comprehensive preparation for the intelligent practice of "psychological medicine" is urgently needed.

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Following the decision of the Ministry of Food to add calcium to the reinforced loaf, a number of papers upon calcium intake have appeared in scientific publications, and this is regarded as serving a useful purpose, since the part played by this element in the body, as, for instance, its effect on renal function,

is not wholly clear. Among other things it seems that there is still some doubt as to the minimal requirements of the adult. One proof that the added calcium in the reinforced loaf will be efficiently utilized is afforded by the experience of paediatricians who have found it to be well absorbed after addition to soya-bean flour.—Edit., *J. Roy. Inst. of Pub. Health & Hyg.*

## PLASTIC CORRECTION OF PROTRUDING EARS IN CHILDREN

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DURING the past twenty years the psychological effect of deformities of the ears has received ever increasing consideration, with corresponding improvement in the surgical procedures employed to correct these abnormalities. Examination of the methods described years ago conveys the impression that a single technique is adequate, irrespective of the type of anomaly present. The fact that improvements are constantly being suggested indicates that no single type of operation is suitable for all cases.

The most important effect of protruding ears on a child is psychological, and may be expressed either in a feeling of inferiority which may cause the child to avoid personal contacts, or perhaps to develop a super-abundance of self-expression in an effort to compensate an injured ego. The latter may result in objectionable social behaviour which may cause the parents considerable anxiety. Children have a keen ability to detect the unusual and any abnormality in a playmate is the object of frank curiosity and ridicule. Almost invariably the child is labelled with a nickname which refers to his defect and appears to have a permanent character from which he feels there can be no escape. Not infrequently the parents anticipate the situation before the child is old enough to be aware of the defect and arrange to have the necessary surgical correction carried out at an early age, when the repair is most easily performed.

The formation of the external ear (Fig. 1) begins about the sixth week of fetal life from the first and second branchial arches and has assumed definite form by the third month. The deformity is considered to be congenital, though the nature of the embryological factors which cause the prominence of the ear is not known. The normal cephalo-auricular angle is about  $30^{\circ}$ . One or both ears may be affected and their size or shape may differ. Occasionally the whole ear may be rotated or occupy an abnormal position on the head. However, two types of abnormally prominent ears are most frequently seen; *first*, those in which the antihelix is quite well formed but there is marked increase in size and

convexity of the cavum conchæ, forming the so-called "cat-ear"; *second*, those in which the cavum conchæ is normal in size but there is incomplete development of the antihelix, especially of the crura. The latter is more common and a combination of these two types is also seen.

Numerous types of operation<sup>1 to 8</sup> have been described for the correction of protuberant ears.

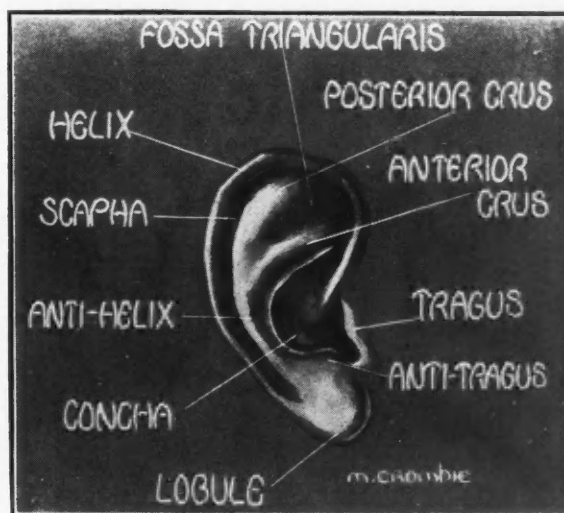


Fig. 1

These vary from the excision of an ellipse of skin to quite complicated procedures. Probably excision of skin alone never results in permanent improvement in the presence of a pronounced abnormality due to the persistent tension of the cartilage. Two points are worthy of emphasis: *first*, the correction is more easily obtained in a very young child since the cartilage is softer and more pliable; *second*, the procedure chosen should vary with the type of deformity present.

With reference to the first item, while the operation may be performed at any time the optimum period is between two and five years of age. The auricular cartilage is soft and easily shaped and the child will enter school with normally shaped ears which will not excite unfavourable comment from classmates. Consideration of the second point is most important. While many procedures have been advocated for the plastic correction of abnormally prominent ears the fact should be recognized that different parts of the ear may be deformed and a surgical



procedure should be chosen which will most easily restore the normal anatomical structure. In a series of 20 cases I have found the following procedures most practical.

#### METHOD

The most advantageous position is that in which the patient is placed on the operating table on his back, as this permits a full view of the face so that the symmetry of the final position of the ears may be checked. The hair is shaved in crescentic form for a distance of one inch above the hair line. Local anæsthesia or avertin and ether may be employed. We have found that local anæsthesia supplemented by careful premedication with morphia and nembutal is adequate for most cases. The operative field about each ear is prepared with green soap, alcohol, and tincture of merthiolate, and draped with sterile towels which are sutured in place. This permits comparison of the auricles during the operation and simplifies draping of the patient.

If the concha is abnormally large and concave, with a relatively well formed antihelix, the most effective procedure is that in which an ellipse of skin is excised, extending from the point at which the helix joins the temporal region to the lobule inferiorly. The long axis of the ellipse is situated at the cephalo-auricular junction. The greatest width of the strip of skin should measure between one and two centimetres, depending on the degree of projection of the ear. A crescent-shaped piece of cartilage of suitable size is then removed so that the spring of the cartilage is broken. The distal margin of the cartilage is sutured to the galea with interrupted sutures of fine stainless steel wire (38 to 40 gauge), so that the pinna is held in æsthetic relationship to the head. The skin incision is then closed with similar interrupted sutures. A strip of xeroform gauze is applied to the suture line and a pressure dressing is adjusted over the ears.

In those cases in which the deformity is due to a lack of development of the antihelix and its crura, particularly of the posterior crus, we have found the following procedure most satisfactory (Fig. 2). An ellipse of skin is removed as in the first method, and by careful dissection the dorsal surface of the auricular cartilage is exposed in the region where the reconstructed antihelix and crura will be situated. The ear is pressed back against the head and the contour of the helix is outlined on the scalp with dye in order to indicate the general position of the ear. The unfolded portion of the antihelix will reform itself sufficiently to show the contour line of the required reconstruction. The line of the proposed contour is marked on the anterior surface with methylene blue. This is then transferred to the posterior surface of the auricular cartilage by making a series of punctures along this line with a hypodermic needle which pierces the anterior surface of the ear at right angles and emerges on the posterior surface of the auricu-

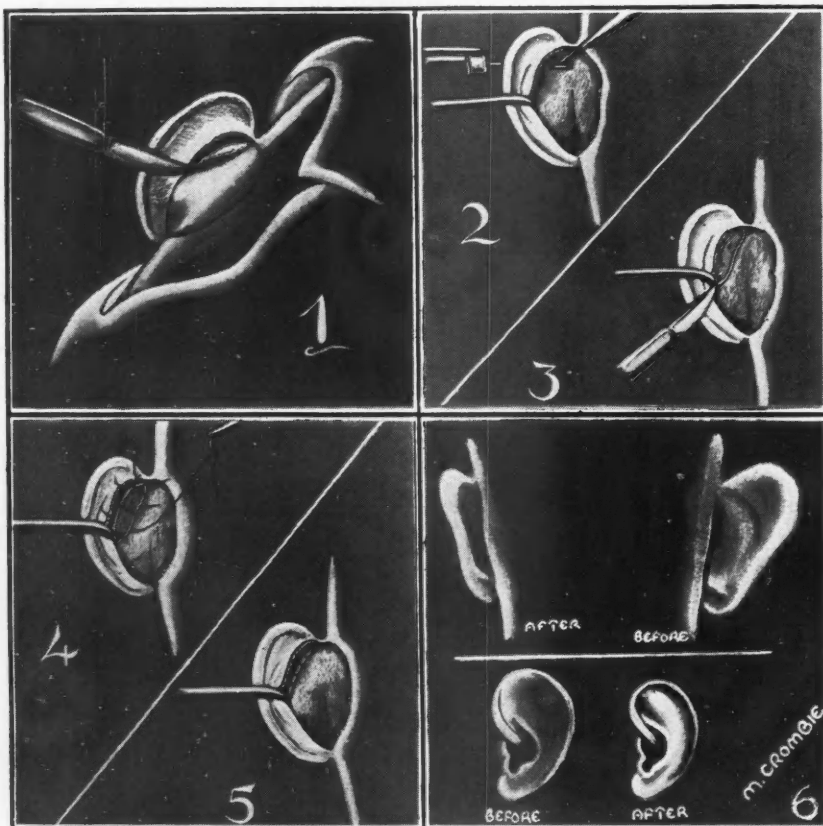


Fig. 2

1. Excision of ellipse of skin.
2. Method of marking the site of the future antihelix with methylene blue.
3. Incising an ellipse of cartilage to limit the form of the antihelix and its posterior crus.
4. Method of inserting mattress sutures of stainless steel.
5. A double layer of sutures may be inserted if the cartilage is stiff.
6. Final position and shape of the reconstructed ear.

lar cartilage. The point of emergence is marked with a pen dipped in dye. The ear is drawn forward and all points are then connected with methylene blue. In younger children it will be sufficient merely to incise the cartilage from one to two millimetres on each side of the line of the future antihelix and crus. Fine wire horizontal mattress sutures are inserted through the cartilage on each side at intervals, and these are tied in sequence to produce the required amount of folding of the cartilage. In older subjects in whom the cartilage is more rigid it is necessary to excise two small wedge-shaped strips of cartilage. The apex of the wedge is situated at the perichondrium of the anterior surface of the ear which is not perforated. The strips are slightly curved and join at their upper and lower ends. Mattress sutures are then inserted to reform the

antihelix and crus. Steel wire possesses a definite advantage in that it causes minimal reaction in the tissues and the sutures maintain the shape of the reconstructed ear until union is firm. When catgut or silk is used there is a greater danger of infection developing than when steel wire is employed.

When it is possible to avoid the excision of fairly wide strips of cartilage we have found that the contour of the reformed antihelix and crus is smoothly convex and can be made to vary in width thus reproducing more accurately the normal form.

The skin incisions are closed with interrupted sutures of fine wire and 5 per cent xeroform gauze is applied. A pressure dressing is adjusted which eliminates all dead space and supports the newly formed convolutions.



**Figs. 3 to 8.**—G.D., aged 8 years. The antihelix in this patient was fairly well developed and the prominence of the ears was due to abnormal development of the cavum concha. Removal of cartilage from this region corrected the protuberance of the ears. A local anæsthetic was used. **Figs. 9 to 14.**—N.T., aged 3 years. Bilateral deformity of the antihelix with correction by the second method. A local anæsthetic was used.

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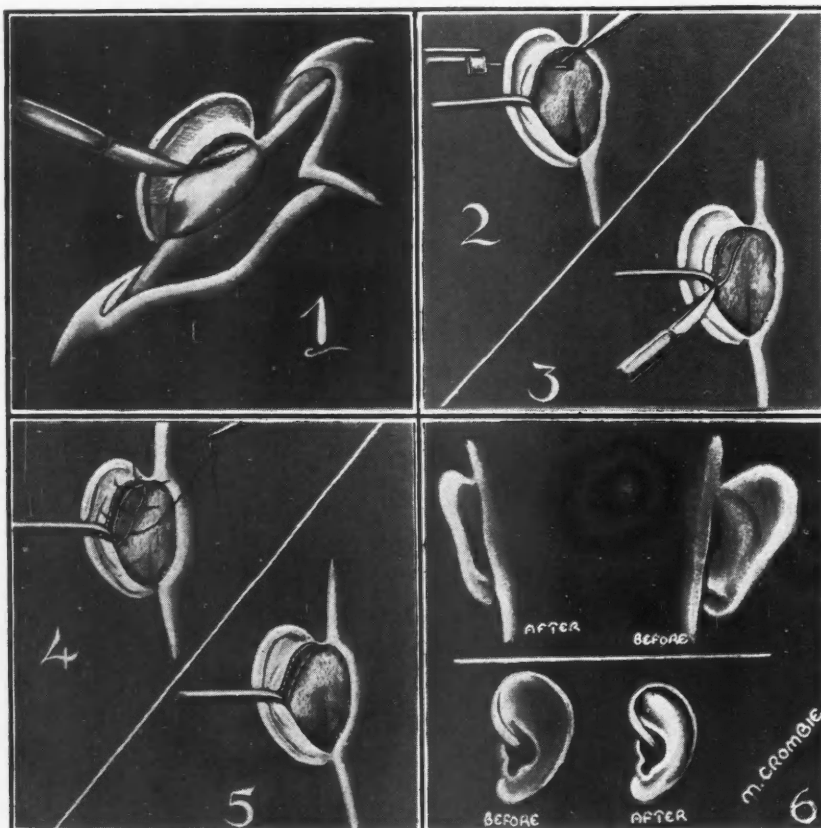


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Figs. 15 to 20.—L.S., aged 5 years. In this case the deformity was due to almost complete failure of development of the antihelix, especially on the left side. The left ear was larger. Note the similarity in the size of the ears following reconstruction of the antihelix. A local anæsthetic was used. Figs. 21 to 24.—R.H., aged 12 years. Note the failure of development of the helix as well as the antihelix, especially on the left side. The helix was reconstructed by a separate operation. A local anæsthetic was used. Figs. 25 and 26.—E.M., aged 10 months. Unilateral malformation of the antihelix treated by the second type of operative procedure. A local anæsthetic was used.

#### SUMMARY

Since abnormally prominent auricles are almost invariably due to a congenital anomaly of structure no measure short of surgical reconstruction will restore the ears to their normal position. In young children subsequent growth of the ears is not interfered with.

The type of surgical procedure chosen depends upon the type of deformity present. Each case and each ear presents an individual problem. When the normal convolutions are restored abnormally large ears are actually reduced in size.

The use of fine stainless steel sutures throughout is advantageous. The danger of infection,

slight though it may be, is reduced and the sutures retain their positive support until long after the readjusted cartilage has become firmly united in its new position.

Following operation the appearance of the patient is greatly improved. Feelings of inferiority and mental complexes are rapidly eliminated, and future social and business relationships are made much more agreeable.

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## CONGENITAL APLASIA OF THE COSTAL CARTILAGES

(REPORT OF A CASE)

BY FLIGHT LIEUTENANT C. S. BARKER

*R.C.A.F. Medical Branch, Toronto*

CONGENITAL abnormalities of the ribs are fairly common and are the subject of a considerable volume of literature. In a series of over 5,000 x-ray examinations White<sup>1</sup> found 20 cases of cervical rib. Other abnormalities mentioned by him are articulation between the first and second ribs, bifurcation of the ends of the third,

ages and the anterior parts of the ribs, that it does not occur at any constant level, that it is unilateral, and that the first rib is usually unaffected.

In 1934 Colman and Bisgard<sup>3</sup> published a survey of the literature dealing with congenital aplasia of the costal cartilages. It is interesting

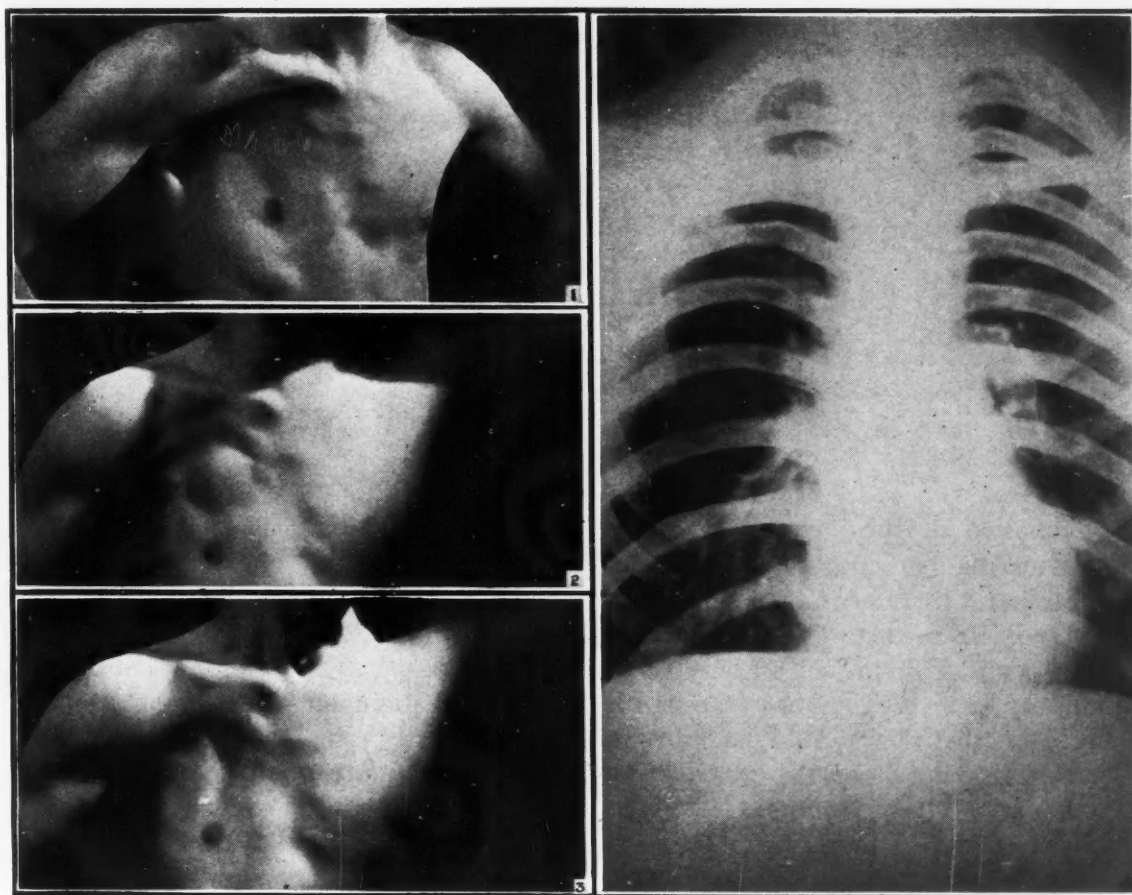


Fig. 1.—Illustrates the flattening of the chest wall on the right side and the absence of the thoracic part of the pectoralis major. Fig. 2.—Illustrates how the chest wall can be blown out in the region of the costal defect by obstructed expiration. Fig. 3.—Illustrates how the same area can be drawn in by obstructed inspiration. Fig. 4.—Shows the costal defects.

fourth and fifth ribs, and considerable variation in the size of the first rib.

Smith<sup>2</sup> searched the literature for reports of complete absence of ribs, and in 1913 reported that he could find only 9 cases. He concluded from the study of these that congenital arrest of development is more frequent than complete absence of ribs. He notes that arrest of development is generally manifested at the costal cartil-

that the first report found was that of Lallemond published in 1826. His patient was described as having a depression as big as a fist in the left thorax, due to the absence of the third, fourth and fifth cartilages on that side. The survey mentions also Grepot's case, an acephalic monster with only nine ribs on the right and seven on the left side. Reports of similar deformities were published subsequently by others. Some



of these deformities were associated with herniation of lung, spleen or stomach. The survey covers 12 cases of congenital aplasia of costal cartilages in detail. Interesting points are that all patients were males, that 8 out of 12 cases were on the right side, that the only ribs involved were in the upper thorax down as far as the fifth, and that ribs 3 and 4 were involved in every case. Frequently accompanying this abnormality of the thoracic bony structure, was a deficiency of part or all of the pectoral muscles, and an absence or misplacement of the nipple. The survey mentions the various theories of the etiology of the condition. Most of these attribute it to pressure by some structure on the thorax during intra-uterine life. The authors indicate their belief that hereditary factors or factors in early fetal life may play some part. As this aplasia of the costal cartilages is rare it is thought worth while to report another case.

#### CASE REPORT

During a routine examination a young man of 19 was found to have a marked flattening of the right

upper chest. On close examination the thoracic portion of the pectoralis major muscle was found to be entirely absent. The pectoralis minor, if present at all, was very rudimentary. The anterior part of the chest over the region of the third and fourth costal cartilages could be blown out or sucked in at will by the patient if he inspired or expired against resistance. Obviously a deficiency of the chest wall existed. On x-ray examination this deficiency was found to be due to the absence of the costal cartilages of the third and fourth ribs on the right side, plus a thin third rib shorter than normal, and a fourth rib which, although well developed, was also shorter than normal. The second rib on the right seemed a little smaller than that on the left. X-ray studies of the spine and pelvis revealed no other abnormalities. The above points are demonstrated in the photographs. The lad stated that he had been born with the condition, and that the doctor had told his mother that the ribs had not joined. He suffers no inconvenience from the deformity of his chest or from the defect in the pectoral muscles. The clavicular portion of the pectoralis major seems to compensate well for this deficiency. There is no weakness of the right arm. No other abnormalities are present and the general health is good. He is assessed as medically fit for full flying duties.

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### "SURGICAL GLOVE" DERMATITIS

BY J. F. BURGESS, M.D.

Montreal

THE observation of three cases of "rubber glove dermatitis" in surgeons over the past year has occasioned this report.

1. A.B., aged 45, a surgeon, first noticed an increasingly marked irritation of his hands which began in June, 1940. When first seen he presented a somewhat thickened, smooth, brownish-red, sub-acute eruption on the dorsa of both hands, terminating at the wrists (see Figs.). On account of a mild erythema of the forehead and face it was at first thought to be pellagroid. However, within a few days, the tendency to clear up, associated with flare-ups, noted particularly about eight hours after operating, suggested an external or contact factor. He was then tested out by the scratch method to powder, orris root, lycopodium. All were negative. Patch tests were done to other contacts in his work, rubber gloves, soaps, etc. All these tests were negative, except for the rubber material which gave a delayed reaction which did not appear until 48 hours later, the test having been removed in 24 hours. To avoid the possibility of impregnation of some antiseptic solution in old

gloves new unused rubber was used, and again a delayed reaction was obtained, which was marked in 60 hours and did not disappear until a week had passed.

As this was a very serious condition from a surgeon's standpoint he decided to try latex gloves. Patch tests were made and these were completely negative. Since that time, by using a pair of fine silk or cotton gloves beneath the latex gloves (to avoid further sensitization) he has been able to carry on with his work without further difficulty (Figs. 1 and 2).

2. C.D., aged 62, developed a dermatitis of the dorsa of both hands in April, 1941, which was characterized by its involvement of the dorsa of the hands, sharply demarcated over the wrist and a well-defined area on the flexor aspect extending from the thick skin of the palms over the carpal bones. Tests here, again, showed a delayed reaction to his rubber gloves, as in Case 1. Under soothing therapy and x-ray treatment the dermatitis cleared up, and he was able to carry on his professional work by substituting latex gloves.

3. E.F., aged 25, a sufferer in his early youth from atopic eczema, developed a dermatitis of an exudative, papulo-vesicular type, involving the dorsa of the hands and also the forearms.

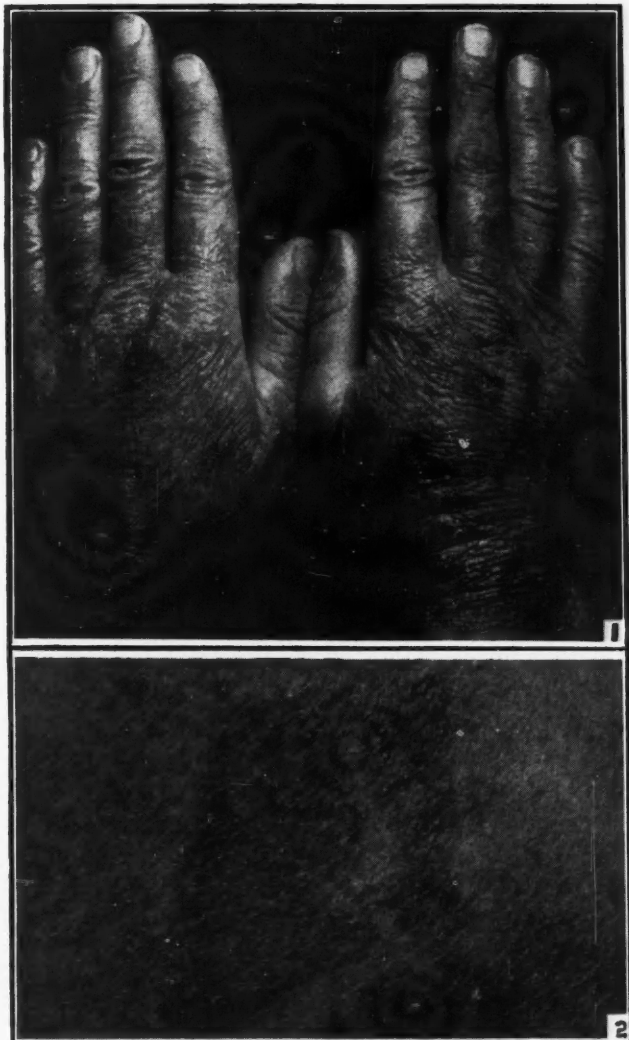


Fig. 1. Case 1.—Marked tumid dermatitis of dorsum of hands. Fig. 2. Case 1.—Patch test showing reaction 48 hours after its application to rubber glove.

This was at first thought to be due to alcohol or soap contact, on account of the involvement of the forearms, but subsequent tests determined that he had become sensitized to rubber gloves and that these had been worn over his forearms in doing surgical dressings. In this case, also, patch tests to rubber glove gave a similar delayed positive reaction.

The above three cases represent a form of dermatitis caused by rubber gloves that apparently is of relatively recent origin. It would seem to be due to some special processing of the rubber, not perhaps of the same nature as that used a few years back (I have no knowledge of the character of this process). It does not seem to be related to that recently described by Oliver *et al.*,<sup>1</sup> in which thick rubber gloves worn by workers in a chemical factory caused depigmented areas of the hands as a result of the presence of a substance "algerite alba". In none of the cases here presented did any depigmentary changes follow on the dermatitis produced by the rubber gloves.

In all three cases the reactions to the rubber patch tests were delayed and only apparent after 48 to 72 hours had elapsed.

Latex gloves serve as a suitable substitute for the ordinary surgical gloves.

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#### RÉSUMÉ

Trois cas de dermatoses des mains sont rapportés où il est démontré que les gants de caoutchouc sont l'agent nocif. Des "patch-tests" au caoutchouc ont toujours été positifs alors que les mêmes tests furent négatifs lorsque d'autres éléments suspects furent étudiés. Ces ennuis disparaissent avec l'emploi de gants fabriqués avec un produit nouveau dénommé "latex", ont la texture très souple réalise une élasticité qui n'irrite pas l'épiderme.

JEAN SAUCIER

SYNTHETIC VITAMIN IS ALLERGY CAUSE.—Latest addition to the long list of substances that can cause trouble for patients with allergies is synthetic vitamin C which now takes its place with ragweed pollen, feathers, milk, eggs, wheat and other causes of hay-fever, asthma, hives and headaches. The apparent allergy to synthetic vitamin C in patients with fruit allergies is reported by Dr. Albert H. Rowe, "Elimination Diets and the Patient's Allergies". Fruit allergies are not new. Almost everybody knows someone who gets hives after eating strawberries. Some persons are allergic to several fruits and even

at times to all fruits. Others can take cooked but not uncooked fruits. Since fruits are an important source of the antiscorvy vitamin C, the patient on a fruit-free diet to keep free of hives, gastro-intestinal upsets, headaches or other allergic symptoms might get his needed vitamin C by taking the synthetic preparation which is just as good for preventing scurvy as the natural form. Some of them, according to Dr. Rowe's findings, cannot take the synthetic vitamin, however, and must get their vitamin C from various vegetables rich in this vitamin.—*Science News Letter*, August 2, 1941.

## CYSTIC FIBROSIS OF THE PANCREAS\*

BY F. W. JEFFREY

*Ottawa*

CYSTIC fibrosis of the pancreas is a definite disease entity with a rather typical symptomatology. In those cases which survive the neonatal period the course is characterized by failure to gain weight, rather voluminous, sometimes frequent, stools, and the existence of a chronic respiratory infection. When the illness persists beyond the sixth month the appearance of the celiac syndrome becomes an added feature.

In this paper 88 cases from the literature are analyzed and 2 new ones are presented. Included in this series is a group of 49, all thoroughly reviewed by Andersen<sup>1</sup> in her paper on "Cystic fibrosis of the pancreas and its relation to celiac disease". Of these, 20 are from the pathological files of the Babies' Hospital, New York, and 29 have been collected from the literature on celiac disease, steatorrhœa, pancreatic insufficiency, and vitamin A deficiency. Andersen's paper forms a comprehensive study of all recorded cases up to the time of publication in August, 1938. In addition 35 cases, collected from over 2,800 autopsies, were reported by Blackfan and May<sup>2</sup> in November, 1938. The pathology was described and the clinical features reviewed. Five of these are included in Andersen's group. Seven additional reports of authentic cases<sup>3, 5, 6</sup> are also included. Other cases appearing in the literature, with clinical manifestations suggesting this condition, have been excluded from this analysis because the diagnosis was not confirmed by autopsy.

The pathological findings were similar in most instances. The pancreas was usually normal or slightly reduced in size, normal in colour and contour. On section it was firm. The duct was definitely stenosed or atretic in five cases and possibly in four more. The pancreas presented a typical microscopic appearance. The acini and small ducts were dilated and their epithelial lining flattened. The lumina contained concretions of various sizes laid down either in concentric rings or in homogeneous masses. These cysts varied in size, but the larger type were un-

common in the youngest infants. The stroma surrounding the acini and lobules was increased. It contained a moderate to large amount of fibrous tissue, and was infiltrated with lymphocytes, plasma cells, and macrophages, frequently to an extent suggesting subacute or chronic pancreatitis. The islets of Langerhans in most cases were normal in number and appearance. In five instances the pancreas was fatty in appearance, and when examined microscopically revealed no evidence of cystic fibrosis, but rather an almost complete replacement of the acini by adipose tissue. In one case in the literature (Harper's<sup>3</sup> case IV) there was no apparent dilatation of ducts or acini and their lining epithelium was normal. There was, however, an increase in stroma, not particularly fibrous but with considerable cellular infiltration. This description also conforms to the second case presented in this paper. At least 90 per cent of the pancreas was involved in all cases.

Another consistent finding, except in those dying in the neonatal period, was a pulmonary infection, usually of the chronic pneumonic type. The bronchioles and small bronchi were dilated, their walls thickened and surrounded by infiltrations of large mononuclear cells and lymphocytes. The dilated bronchioles were filled with masses of polymorphonuclear leucocytes, and in many cases had ruptured to form small multilocular abscesses. Extensive replacement of lung parenchyma by connective tissue and some regeneration of alveolar epithelium were found in the more chronic cases.

Metaplasia of lining epithelium to a stratified squamous type was occasionally noticed. This finding, characteristic of vitamin A deficiency, occurred in various parts of the body, such as the trachea, bronchi, renal pelvis, and pancreatic ducts. In many instances large deposits of fat were found in the liver cells.

The clinical manifestations of cystic fibrosis of the pancreas were found to be dependent upon the age at which death took place. An analysis of these 90 cases revealed that they could be divided into three definite groups as suggested by Andersen.

\* Read before the Eighteenth Annual Meeting of the Canadian Society for the Study of Diseases of Children, Brockville, June 14, 1941.



The first group is made up of those dying in the neonatal period, and comprises 11 infants. Ten died with symptoms of intestinal obstruction. Of these 2 were due to inspissated meconium; 1 to a fibrous band across the terminal portion of the ileum; and the remaining 7 to intestinal stenosis. The one case that had no symptoms of obstruction was found to have cirrhosis of the liver, in addition to the cystic fibrosis of the pancreas. Three of the five cases in this group, reported by Andersen, had associated congenital anomalies; Meckel's diverticulum in one, atresia of the cystic duct in another, and congenital heart in the third.

The second group consists of 42 infants all dying in the interval between the neonatal period and six months of age. The clinical features in these cases were characteristic. They failed to gain weight despite an adequate diet, generally taken well without vomiting. Usually this was noticed first in the neonatal period and found in breast- as well as bottle-fed infants. Diarrhoea was rather uncommon, but frequently the stools were large, and infrequently recognized as fatty. Commonly, the abdomen was reported as large. An intolerance to fat in the diet was noted occasionally. Associated with these gastro-intestinal symptoms were signs of infection in the respiratory system. These signs usually appeared later and persisted until death, but occasionally preceded the appearance of the nutritional difficulty. The cough was irritative at first, finally becoming productive, and in some cases was sufficiently paroxysmal to suggest whooping-cough. Cyanosis was noticed commonly towards the end. Fever and dehydration were not prominent until relatively late in the course of the illness.

The laboratory examinations recorded in this group added nothing to the clinical picture. Estimations of fat in the stools were reported in two cases. In both the total fat was 59 per cent of the dried faeces. Of this 96.7 per cent was split in one case, and 82 per cent unsplit in the other. Roentgen study demonstrated pulmonary infection and occasionally osteoporosis.

The third group comprises 35 cases, all dying after the sixth month, the oldest at fourteen years. In all but three instances the course was characterized by the appearance of the coeliac syndrome, in addition to all the clinical features typical of the second group. Large foul, often fatty, stools were noticed, invariably before the seventh month, and usually during the sixth

month. Subsequently the characteristic manifestations of the coeliac syndrome, protuberant abdomen, malnutrition, hypotonicity, and fatty stools, gradually developed. The three exceptions were among those dying in the seventh month. In these fatty stools had not been observed, and the course of illness was similar to that in group II. All cases finally succumbed to a chronic respiratory infection.

The laboratory investigations in the third group are of interest. Estimations of fat in the stools were recorded in ten cases, varying from 24 to as high as 60 per cent, averaging 45.5 per cent. Of these, eight were differentiated into split and unsplit forms, the former predominating in four cases and the latter in the remaining four. Glucose tolerance tests were reported in seven cases. The curve was high in three, flat in three, and normal in one. An examination of the duodenal contents in three cases revealed a complete absence of pancreatic ferments (diastase, trypsin and lipase). Roentgen study demonstrated pulmonary infection and occasionally osteoporosis.

There is considerable difficulty in differentiating this type of coeliac syndrome, sometimes termed pancreatic steatorrhoea, from the idiopathic type or the so-called coeliac disease, in which the pancreas is essentially normal. However, there are a few points of distinction. In contrast to coeliac disease or idiopathic steatorrhoea the onset occurs usually at an earlier age, and the course is shorter. Death is invariably due to a respiratory infection. Recurrent attacks of diarrhoea preceding the appearance of the fatty stools are relatively rare. The stools are often oily in appearance (butter stools) due to passing of unsplit fats. Anorexia is rather uncommon. Coeliac diets produce no improvement. The glucose tolerance curve is often on the high side of normal. The differentiation can be made with more certainty by an examination of the duodenal contents for pancreatic enzymes. Some significance is attached to a high nitrogenous excretion in the faeces of the pancreatic type.

#### CASE 1

Baby S. was first seen on July 5, 1938, at 6 days of age. She was losing weight despite an adequate supply of breast milk, dropping to 5 lb. 3 oz., 7 oz. under birth weight. She had been delivered, at one week before term, from a primiparous mother of 23 years of age. Following delivery the baby's condition was satisfactory, but she was rather drowsy for 4 or 5 days and nursed poorly. Physical examination at 6 days revealed nothing unusual, and subsequently the infant began nursing more vigorously and was discharged with the mother at 14

days, weighing 5 lb. 9½ oz. (½ oz. under birth weight).

The baby progressed favourably for 5 weeks. However, the weight gain was inadequate, and, as the supply of breast milk was not sufficient, she was weaned at 8½ weeks of age onto a formula of evaporated milk, 10 oz.; water, 17 oz.; sugar, 2½ tablespoonfuls. Orange juice and a concentrate of cod liver oil were now supplemented. Three days later a cough and nasal discharge developed which persisted, but was not accompanied by an elevation of temperature. The baby appeared bright and happy, continued to take her formula well and to have normal stools.

On September 15th the weight was only 8 lb. 4 oz. (which was about 1½ lb. underweight for the height). She had been on the formula for 1½ weeks with no apparent gain, despite refusing only 1 or 2 ounces daily. This gave an intake of approximately 60 calories per pound. At this time a few moist râles were heard in both lungs.

Two weeks later, at 12 weeks of age, the baby had gained only 2 oz. (8 lb. 6 oz.). The nasal discharge had subsided but the cough was slightly worse. She was still afebrile, but physical signs in the chest had increased, particularly on the right side. An x-ray at this time revealed the right pulmonary field slightly and uniformly less illuminated than the left. The infant was now somewhat emaciated, but was still taking the formula well without vomiting, and having two to four apparently normal stools daily. The strength of the formula was increased to afford 80 calories per pound.

On October 18th, at 3½ months of age, the weight was 8 lb. 2 oz. representing a loss of 4 oz. in 3½ weeks. She was refusing only 1 to 4 ounces of formula daily, not vomiting, and still having normal stools. She was bright and alert, holding her head erect and smiling frequently. The cough was somewhat worse, slightly paroxysmal, but not accentuated at night, and not associated with vomiting or cyanosis. There seemed to be no change on physical examination. The hæmoglobin was 65 per cent (Dare). A tuberculin skin test showed no reaction. Whooping-cough plates were negative. An x-ray of the chest on this date showed the pulmonary fields equally illuminated, but the bronchial tree radiating from each hilus extended out in a thickened fan-shaped fashion to the third zone, with slightly more thickening on the left than the right. There was no localized discrete parenchymal involvement.

In an attempt to obtain a gain in weight, banana pulp was added to the diet, along with fairly large doses of vitamin B and iron.

On November 1st, at 4 months, the baby had gained 7 oz., weighing 8 lb. 9 oz. She was refusing 4 or 5 oz. of formula daily, but there was no vomiting, and the stools were reported as normal. The cough continued to be paroxysmal, but was not worse. Physical examination revealed very little change in the lungs, but the abdomen was at this time slightly distended.

During the next week the baby's condition became increasingly grave. She was still afebrile but her cough had become worse. The paroxysms were very severe and associated with considerable cyanosis and occasional vomiting. She was now refusing from 5 to 15 oz. of formula daily, and having occasional loose green stools. The formula was changed to 2 per cent milk, water and corn syrup, but there was no improvement.

On November 8th she was hospitalized. She was pale, listless, marasmic, weighing only 7 lb. 2 oz. The ears, nose, and throat were negative. There were numerous râles throughout both lungs, and the respiratory rate was 60. The heart was normal. The abdomen was soft and slightly scaphoid. An x-ray on November 8th again showed a marked increase in the bronchial tree shadows, radiating out fan-shaped, well into the second zone of both lungs, but particularly the right. During her 9 days in hospital the cough was particularly severe, still paroxysmal, and associated with marked cyanosis, which towards the end persisted between the attacks. The respiratory rate remained between 58 and 64. An oxygen tent seemed to give some relief. She was refusing 7 to 15 oz. of her formula daily, but not vomiting. The third

day after admission the stools increased to from 4 to 7 daily, becoming loose and mucoid in character and green to yellow in colour. The formula was changed to protein milk and dextri-maltose with no benefit. For 3 days prior to death she was fed by gavage. During the last 7 days the temperature ranged from 101 to 102°. With the help of two blood transfusions her weight rose during the first 6 days after admission from 7 lb. 2 oz. to 8 lb. 3 oz., but dropped to 8 lb. at death 3 days later.

She died on November 17th at 4½ months of age.

**Necropsy.**—The anatomical diagnoses were: cystic fibrosis of the pancreas with chronic pancreatitis and inspissation of pancreatic juice, chronic purulent bronchitis and bronchiolitis, bronchiectasis, chronic interstitial bronchopneumonia (all lobes), and fatty infiltration of the liver (slight).

**Macroscopic observations.**—Both lower lobes of the lungs, and to a lesser degree the other lobes, were firm and lumpy, and on gross section showed numerous rounded firm nodules which were dark greyish-red and exuded beads of pus on pressure. The bronchial mucosa was congested. The pancreas was normal in size, shape and consistency. The remainder of the viscera appeared normal on gross examination.

**Microscopic observations.**—Sections through the pancreas (Figs. 1 and 2) showed a marked increase in fibrous connective tissue, not only between lobules but also between individual acini. A diffuse infiltration with chronic inflammatory cells was seen in the areas of fibrosis; it was chiefly lymphocytic in type, with occasional plasma cells, polymorphonuclear leucocytes, and macrophages (Fig. 1). The acini and small ducts in the areas of fibrosis were uniformly dilated and cystic, their lining epithelial cells flattened, and their lumina filled with inspissated granular material arranged in concentric rings or in homogeneous masses with enmeshed chronic inflammatory cells (Fig. 2). The islet tissue appeared normal. No evidence of metaplasia of the duct or acinar epithelium to a squamous variety was noted.

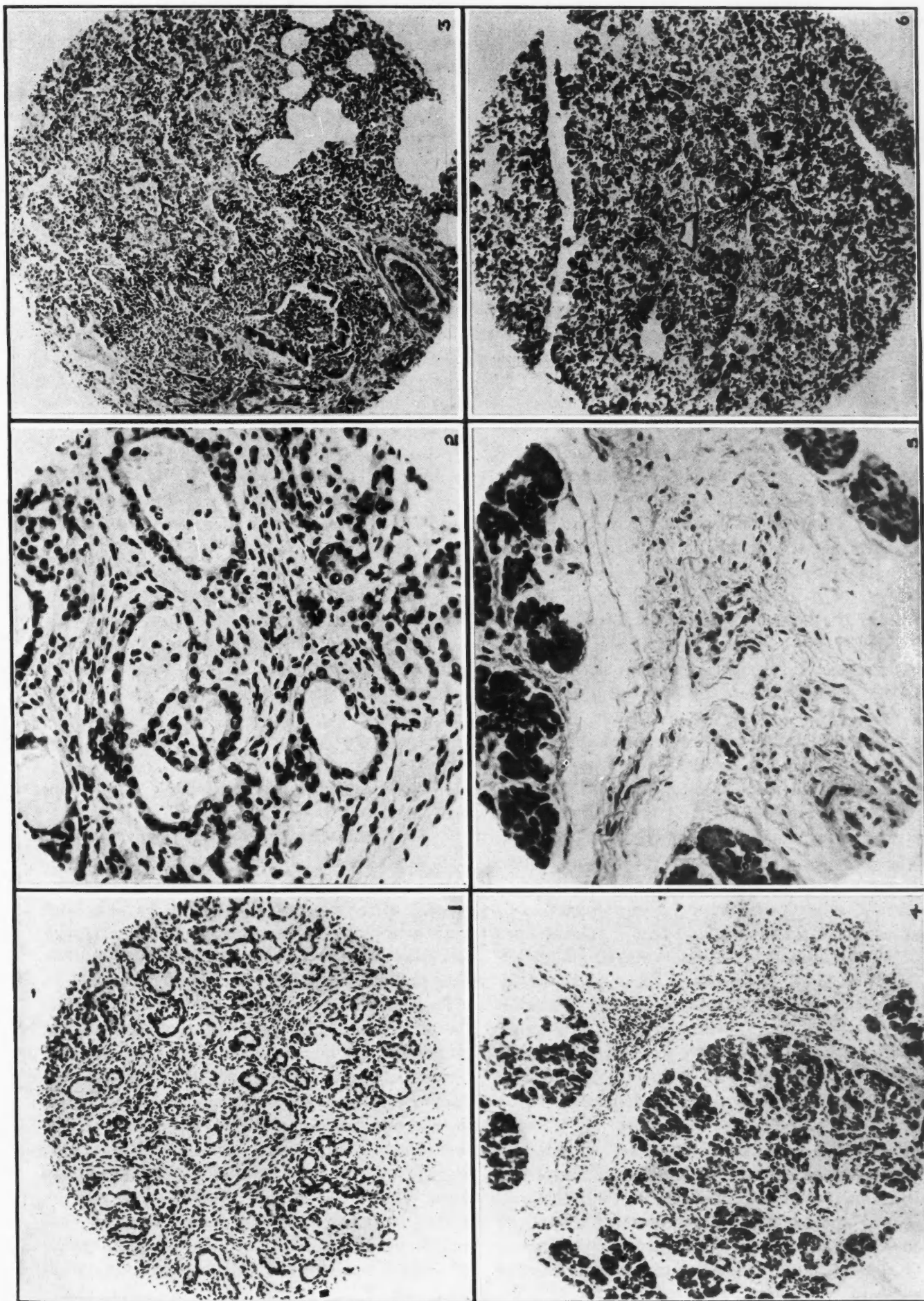
Sections through various parts of both lungs (Fig. 3) revealed a pneumonic process which was chiefly peribronchial in distribution. The bronchi and bronchioles were moderately dilated and plugged with purulent exudate. The epithelium of these structures was of the columnar variety in all of the sections studied, there being no evidence of metaplasia. The peribronchial tissues showed an increased amount of fibrous connective tissue and a good deal of lymphocytic infiltration. The alveolar spaces in the regions of the air passages contained an inflammatory exudate of two main types; in some they were packed with polymorphonuclear leucocytes, while others contained granular material, numerous macrophages and occasional fibroblasts. Most of the alveolar walls appeared thickened. Frozen sections of the lungs stained with Sudan III showed no stainable fat. No tubercle bacilli were seen in sections stained with Kinyoun's stain. Sections through the liver showed an occasional liver cell to be filled with a large fatty droplet. The remaining viscera appeared normal on microscopic examination.

#### CASE 2

Baby Y., was a male infant admitted to hospital May 21, 1940, at 3 days of age. He was born at term, weighing 9 lb. The delivery was normal. He was the eighth child in the family, the others being alive and well. Since birth the infant had been unable to retain fluids, the vomitus gradually becoming greenish and foul in character. Meconium had been passed daily per rectum. On admission the abdomen was distended, but there were no palpable masses. Visible peristalsis and stepladder pattern were noted on the abdominal wall. There was no return from a colonic irrigation. A congenital atresia of the small bowel was diagnosed and the infant taken to the operating room, where an atresia of the small gut approximately two feet above the ileocaecal valve was found. A lateral anastomosis was performed, but death occurred 15 hours later.

**Necropsy.**—Macroscopic observations.—At autopsy, confined to examination of the abdomen through the





Figs. 1 and 2.—Sections through pancreas showing marked increase in fibrous process chiefly peribronchial. Figs. 4 and 5.—Increase in fibrous connective tissue in pancreas. Fig. 6.—Normal pancreas of infant of the same age.



operative incision, the stomach was of normal size, and the small bowel considerably distended down to a point approximately two feet from the ileocaecal valve where a side to side anastomosis had been performed. Distal to this point the gut was slightly dilated for about an inch, but from there on, it was white and collapsed, although a lumen could be felt through the wall. The whole of the large bowel was similarly pale and collapsed. For about 6 inches proximal to the anastomosis the peritoneum was distended by a large amount of fluid blood in the gut wall. The pancreas was removed; it was small and firm, measuring 4 x 19 cm.

**Microscopic observations.**—Sections were made through the tail, body, and head of the pancreas (Figs. 4 and 5) and they showed in each a definite increase in fibrous connective tissue, both between lobules and individual acini. The interlobular fibrous tissue in one area showed a focal infiltration with lymphocytes, but otherwise little sign of inflammatory reaction was noted. The acini and ducts were of normal size showing no definite evidence of dilatation or inspissation of pancreatic fluid. The epithelium of the ducts was of the columnar variety, no metaplasia to a squamous type being seen in any of the sections. The islet tissue appeared healthy.

Case 1 is of considerable interest as its course was followed closely from birth, and the infant's mother was a nurse, making her observations a little more reliable. It presents the diagnostic feature of the second group: (1) a nutritional disturbance beginning in the neonatal period and persisting until death, characterized by a failure to gain, no anorexia, no vomiting, and essentially normal stools; (2) a chronic respiratory infection occurring early in the course, the cough becoming paroxysmal in character, as is often described, and finally terminating in death; (3) the typical pathological findings. The cellular infiltration suggesting chronic pancreatitis, present in this case, has been occasionally observed in the second group.

Case 2 belongs to the first group and demonstrates characteristic changes in the pancreas. The increase in fibrous connective tissue is quite apparent in the microscopic sections (Figs. 4 and 5), as compared with a normal pancreas of an infant of the same age (Fig. 6). The absence of cystic dilatation of small ducts and acini, found in this case, has also been reported by Harper<sup>3</sup> (Case 4). Case 2 is presented because very few instances of this condition appearing in the neonatal period have been published, and while it does not conform to the classical description it is still sufficiently typical to be included in the series.

Cystic fibrosis of the pancreas, as suggested by Andersen,<sup>1</sup> is not so rare as would be expected from the scarcity of references in the literature. In 605 microscopic sections of the pancreas in 1,000 consecutive autopsies at the Babies Hospital they found that 3.3 per cent had over 90 per cent of the gland involved, and 3.5 per cent

between 20 and 90 per cent. She concluded from her study that over 90 per cent involvement was necessary to produce the typical clinical picture.

The incidence of this condition was more frequent in females (68 per cent) than males. It was proved to have occurred in another member of the same family, definitely in three instances, and possibly 7 more in the 29 families that were suitable for this investigation.

Andersen assumes that the pathological changes found in the pancreas are present at birth in practically all cases, as death or the onset of symptoms occurs in the neonatal period. She believes the condition is probably due to a congenital abnormality, but whether the stenosis of the pancreatic ducts was the cause or the result of the changes in the pancreas was not clear. In most cases, according to her, the smaller ducts were the primary site of obstruction. The cellular infiltration found in the first group and in many cases of the second suggests the possibility of inflammation of the pancreas during fetal life. This is considered an unlikely cause, as experimentally it has been shown that cellular infiltration is an early change following ligation of the pancreatic ducts. Later this infiltration diminishes as the connective tissue increases. A deficiency of vitamin A has been considered as a factor in producing the stenosis of the pancreatic ducts. This however is unlikely, as many cases with other manifestations of this deficiency have been found to have normal pancreatic tissue. This vitamin A deficiency is generally ascribed to diminished fat absorption, and therefore is more apt to be the result, rather than the cause, of the lesion in the pancreas. Blackfan and Wolbach<sup>4</sup> explain the pathogenesis by the production of an abnormal secretion which inspissates and leads to distension and atrophy of the ducts and acini.

Rauch, Litvak, and Steiner<sup>5</sup> attempt to explain the association of the pancreatic and pulmonary lesions on an embryological basis. They claim that the *Anlagen* of these two organs are derived from a common entodermal tube, relatively close to each other, and begin to appear at nearly the same time. They assume that during their development some constriction of the excretory ducts occurs to produce this disease entity. Harper<sup>3</sup> attributes the pancreatic lesion to a congenital defect, and the terminal pulmonary involvement to a reduced resistance to respiratory infection. This, however, does not explain those

cases in which the respiratory symptoms preceded the nutritional disturbance.

The intensity of symptoms and duration of life depend possibly upon the amount of anomalous pancreatic gland present, as suggested by Rauch, Litvak, and Steiner.<sup>5</sup> It is recognized that an anomalous gland is more susceptible to infection. Therefore, if the pulmonary tissue, as well as the pancreas, is assumed to be congenitally defective, this increased susceptibility could explain the occurrence of the chronic respiratory infection.

The presence of fat in the liver, so frequently found, has not been adequately explained.

Treatment up to the present has been palliative, although pancreatic extracts have been suggested. It has been demonstrated that when large doses of vitamin A are administered enough is absorbed to prevent a deficiency. In addition to vitamin A the infants should have high caloric feedings, despite fatty and frequent stools.

#### SUMMARY

Ninety cases of cystic fibrosis of the pancreas are analyzed, including 88 from the literature and two herein reported.

The pathological findings in this condition were essentially cyst-like dilatations of pancreatic ducts and acini, filled with concretions and surrounded by fibrous tissue. In all cases

that died after the neonatal period there was also evidence of an associated chronic respiratory infection in both lungs.

From a clinical aspect the cases could be divided into three definite groups, dependent upon the age at which death occurred. Group I consisted of those dying in the neonatal period. Death in most cases was attributed to stenosis of the intestinal tract, and the associated cystic fibrosis was an unexpected necropsy finding. Group II comprised those dying between the neonatal period and six months. This group was characterized by a failure to gain weight, rather voluminous sometimes frequent stools, and a persistent respiratory infection. Group III included those dying after the sixth month. They presented all the symptoms found in Group II, and in addition the clinical manifestations of the coeliac syndrome. All cases in the second and third groups succumbed to a chronic respiratory infection.

I am indebted to Dr. J. C. Paterson, pathologist of the Ottawa Civic Hospital, for his descriptions of the pathological findings, and to Miss Elizabeth Gussow, of the same hospital, for the photomicrographs.

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### TREATMENT OF OSTEOMYELITIS OF THE SMALL BONES WITH X-RAY

By R. MILLER TAIT

Vancouver

THREE or four years ago I was requested to treat an extensive osteomyelitis of the first metacarpal bone and the proximal end of the proximal phalanx of the thumb as a last resort previous to a total amputation of the thumb. The cartilages of the first metacarpo-phalangeal articulation seemed to be entirely destroyed, as the joint space was practically obliterated. I began treatment with considerable misgivings, and decided that the ordinary methods of radiation for osteomyelitis would be probably more or less useless, and, accordingly, I used heavy dosage, with the idea of producing not a stimulating reaction but a destructive germicidal effect on the invading organism. A complete

regression of the infection was obtained, with regeneration of the bone in both the first metacarpal and proximal phalanx of the thumb. The first metacarpo-phalangeal joint was ankylosed, but this was much better than a complete loss of the thumb.

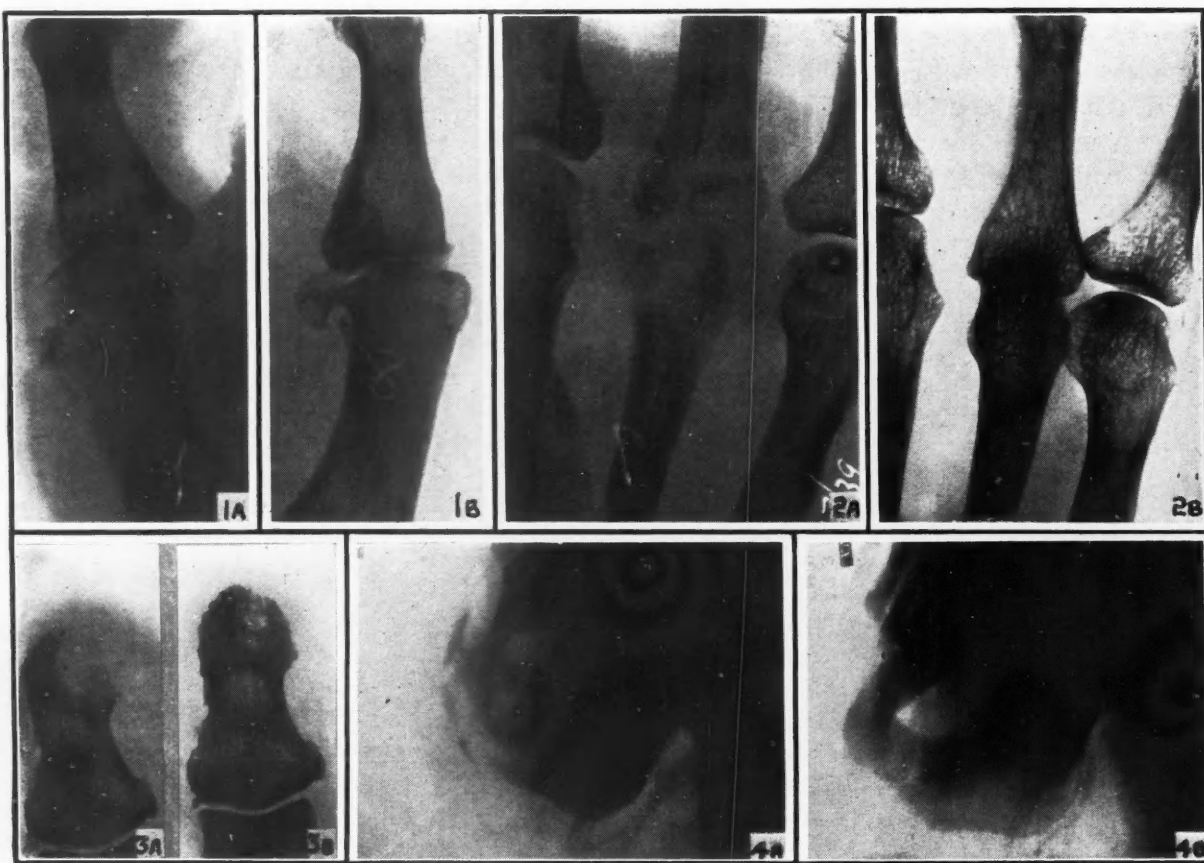
I have since used this method of treatment on a number of osteomyelitic infections involving the bones of the hands and feet with very excellent results. Some had draining sinuses, some had been opened surgically, and one, of the second metacarpal bone, was an acute infection which was not draining and had not been opened surgically.

Probably one of the best results obtained was

in an osteomyelitis involving the calcaneus and cuboid bone and the astragalus, with a periostitis extending upwards along the margins of the shaft of the tibia and fibula. This man, a logger, had had his foot broken in 1926, this injury being followed by an osteomyelitis, with sinuses which had drained over a period of twelve years. His foot had been operated on seven times, besides having had various other forms of treatment, and the surgeon whom he finally consulted in May, 1940, decided that the best form of treatment would be amputation. This man,

had been getting only a few hours' sleep each night, and that following prolonged immersion of the foot in hot water. Following a second intensive course of radiation the drainage has ceased almost entirely, only a few drops of serous fluid now draining from the sinus on the sole of the foot. He has again returned to his logging camp.

I had considerable difficulty with the terminal phalanx of a thumb in which there was a small sequestrum. This did not completely heal until the sequestrum was removed.



in May, received a fairly intensive treatment in a period of about a week or ten days, but had to leave Vancouver to oversee a logging camp which he was operating on the coast, and did not return to Vancouver until September, 1940. In the interval, however, two sinuses on the lateral margin of the foot had closed. One sinus on the sole of the foot was still draining, although considerably less than it had in the previous ten years. The pain in his foot was also gradually diminishing, and he stated that now he could get a full night's sleep, and had gained twelve pounds in weight. He was obviously much more rested than when first seen, because he stated that previous to the first treatment he

I treated two infections of the bones of the foot, five of the hand, and an osteomyelitis of the lower jaw. The following is a brief summary of those treated.

#### CASE 1

Osteomyelitis of the first metacarpal bone and proximal phalanx of the thumb. A total of approximately 1,148 r units was given from November 21, 1938, to December 16, 1938. History of infection, about a year, with two operations; draining sinuses; complete amputation of thumb was advised. Cure, with ankylosis of first metacarpo-phalangeal articulation resulted. Fig. 1a before treatment, Fig. 1b after treatment; clinically well.

#### CASE 2

Osteomyelitis of head of fourth metacarpal bone, with involvement of joint. Draining sinus; 1,600 r units given in first week, followed by further 1,090



in next two weeks. Cure, with ankylosis of third metacarpo-phalangeal articulation. Fig. 2a before treatment, Fig. 2b after treatment.

#### CASE 3

Injury to head of second metacarpal bone two weeks previously. Osteomyelitis. Not operated on. No draining sinus; 1,848 r units given in first week, followed by further 1,176 r units in the following 21 days. Cure. No disability.

#### CASE 4

Cellulitis of terminal phalanx great toe, with small area of recurrent osteomyelitis; 996 r units in first week, followed by about 312 r units in 15 days. Cure. No disability.

#### CASE 5

Osteomyelitis, terminal phalanx of thumb. Draining sinus; 1,876 r units given in first week, followed by 240 r units 7 days later. Cure. No disability. Fig. 3a before treatment, Fig. 3b after treatment.

#### CASE 6

Osteomyelitis, terminal phalanx of thumb. Draining sinus; 2,300 r units given in first week, followed by 1,242 r units in next 17 days. Slight discharge two months later, and further 874 r units given.

#### CASE 7

Osteomyelitis of the lower jaw, extending from and involving the mental protuberance, and extending posteriorly about an inch along one mandible and an inch and a half along the other mandible. Draining sinuses beneath the chin and into the mouth. Two or three small sequestra were removed; 1,370 r units given in first week, followed by 528 r units in next week. Cure. No disability. The lower mandible, owing to poor blood supply, is probably one of the most dangerous bones to treat with x-ray in case of atrophy of the jaw. Fig. 4a during treatment, Fig. 4b during treatment; clinically well, 6 weeks.

I have used as a rule 100 K.V., with 2 to 4 millimetres of aluminum filter, at 10" or 10½" distance, and use approximately 1,000 to 2,000 r units, measured in air, in the first week. This will frequently be sufficient to effect a cure, but at times my total dosage will reach 2,000 to 4,000 r units, extending over a period of another two to four weeks. I try to gauge the dose on the effect produced, and the reaction of the patient. I usually check the effects of the radiation by an occasional film, but find that the clinical signs are of much greater importance, as a bone frequently does not show complete regeneration until a number of weeks has elapsed following a clinical cure. This follows much the same rule as when an advancing osteomyelitis is present, the destruction is usually much greater than shown on the x-ray film. So, too, when the osteomyelitis is regressing the improvement seems to be much greater than one can demonstrate on the film.

I think it wise to use as many skin portals as possible, and in the case of small lesions a comparatively small skin portal can be used at each treatment, the treatment being given through a lead window. In any case, on a hand at least three portals can usually be used; on a finger, four; and on a foot, five or six. I believe that small dosage, although probably beneficial, is not nearly so useful as very heavy dosage approaching the tolerance of the normal tissue.

## THE LIMITATIONS OF ARTIFICIAL PNEUMOTHORAX\*

By J. L. D. MASON, B.A., M.D.

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IN approaching the subject of today's paper and the question, "When should artificial pneumothorax treatment be given up?" I am reminded of a remark by Geoffrey Todd.<sup>1</sup> He writes:

"A prominent chest physician said, 'Fancy Todd reading a paper on the termination of artificial pneumothorax! There must be nothing to say, as we never terminate an artificial pneumothorax'."

On the other hand, Aycock and Keller<sup>2</sup> say:

"Many cases, particularly of the exudative group have remained collapsed *too long*. Many such showed sufficient healing to permit expansion after 12 months. Periods of prolonged collapse, aside from the inconvenience to the patient, promote thickening of pulmonary pleura with a consequent tendency toward fixation of lung with increased fibrosis, associated with the development of

chronic bronchitis, bronchiectasis, emphysema, or bronchial stenosis.

"There seems to be a general fear of re-expansion because of the danger of 'opening up' healed lesions. It is not apparent to us why a healed lesion in a re-expanded lung should reactivate any more readily than a healed lesion in a lung which never had artificial pneumothorax. It has been our opinion for a long time that lesions which 'open up' as a result of so-called strain incident to re-expansion are not healed lesions in the first place.

"The mere act of keeping the lung collapsed for a longer period of time is not going to be a guarantee against such occurrences. While it is believed that artificial pneumothorax limits spread in most of the recent cases obtaining a satisfactory collapse, it does not follow that a spread cannot occur in a collapsed lung."

Between these two opinions there runs the whole gamut of different ideas as to the optimum duration of this form of treatment.

With a view of getting some authoritative information on this rather vexed subject, I

\* Read at the Annual Meeting of the Canadian Tuberculosis Association, Montreal, June 25, 1940.

undertook to send a questionnaire to several of the leading institutions in our neighbourhood, and at the same time have made a short analysis of the cases treated in the Royal Edward Institute, Montreal, by this form of therapy between 1933 and 1940. I may say that many of these patients were transferred from the Pneumothorax Clinic, which had been established by me at the Royal Victoria Hospital in 1922 and which continued there until its transfer to the Royal Edward Institute in 1933, so that the time of treatment dates back in many instances to some years before that date. Further, as the work of the Royal Edward Institute is distinctly that of a diagnostic and clearing station, most of the patients pass on to sanatoria or other institutions where they are followed for some years, and in a few instances return to us for further treatment and ultimate disposal. As a result it has been extremely difficult to check up on the subsequent history of some of these people. On the whole, however, our figures are sufficiently accurate and show at least a fair view of a cross section of these cases.

And now with regard to our questionnaire the following have been kind enough to answer it, and I wish to take this opportunity of acknowledging my sincere indebtedness to them: Fred H. Heise, Trudeau Sanatorium, New York; John N. Hayes, Gebriels Sanatorium, New York; A. M. Cholette, Institut Bruchesi, Montreal, Que.; F. Learn Phelps, Laurentian Sanatorium, St. Agathe des Monts.

From the combined information I drew up the following answers:

1. What is the average length of time that you keep up pneumothorax? Ans. From 1 to 5 years, the average being from 3 to 5 years.

2. What do you consider as contra-indications to the further continuance of pneumothorax treatment in a patient? Ans. (1) Ineffective collapse, especially with a persistent cavity and positive sputum; (2) persistence of fluid, especially tuberculous empyema; (3) formation of fibrosis preventing re-expansion; (4) strong inoperable adhesions; (5) sclerosis of the pleura; (6) advanced contra-lateral disease.

3. What percentage of relapses have occurred in arrested cases which previously had had pneumothorax treatment? Ans. Figures have been difficult to obtain, but the Institut Bruchesi reports for relapse in same lung 5 or

TABLE I.  
CASES OF ARTIFICIAL PNEUMOTHORAX AT ROYAL EDWARD INSTITUTE WHOSE PNEUMOTHORAX WAS STOPPED BETWEEN 1933 AND 1940

Total	222	Classification of these in May, 1940	
		Percentage	
Male....	122	Arrested.....	127 or 57
Female..	100	Active disease.....	38 or 17
		Dead.....	50 or 23
		Unknown.....	7 or 3
			222 or 100
Age groups		Percentage	
Between 10 to 20 years.....		45 or	20
" 20 to 30 ".....		105 or	47
" 30 to 40 ".....		43 or	20
" 40 to 50 ".....		20 or	9
" 50 to 60 ".....		7	} or 4
" 60 to 70 ".....		1	
Over 70 ".....		1	
			222 or 100

At least 143 showed positive sputum before treatment.

#### Duration of artificial pneumothorax treatment

	Percentage
1 year or under.....	86 or 36
Between 1 to 2 years.....	62 or 26
" 2 to 3 ".....	49 or 20
" 3 to 4 ".....	26 or 10
" 4 to 5 ".....	13 or 5
" 5 to 6 ".....	5 or 2
" 8 ".....	2 or 1
	243 or 100

#### Of those who carried on artificial pneumothorax for:

4 years	there are now arrested.....	15
"	" " " active.....	6
"	" " " dead.....	2
5 years or more	" " " arrested.....	15
"	" " " active.....	3
"	" " " dead.....	1

(This death was two years after cessation of six years of pneumothorax.)

#### Reasons for cessation of artificial pneumothorax

Unclosed cavities or ineffectual pneumothorax.....	18
Fluid (including empyema and one with broncho-pleural fistula).....	35
Adhesions.....	74
Arrested disease.....	51
Pleural shock.....	5
Air embolism.....	1
Spontaneous pneumothorax (occurring on three occasions in a bilateral pneumothorax).....	1

Deaths	Percentage
1 year or less after cessation of pneumothorax	21 or 42
2 years " " " " " " " " " "	9 or 18
3 " " " " " " " " " "	6 or 12
4 " " " " " " " " " "	2 or 4
5 " " " " " " " " " "	1 or 2
	39
During treatment.....	11 or 22
	50 or 100

(One from operation for gangrenous appendix. One from carcinoma of oesophagus.)

6 per cent and relapse or involvement of the other side, 15 to 20 per cent.

4. How often has pleural shock occurred in your experience? Ans. The general reply was, "Very seldom", or "Not at all", the highest figure given being 2 or 3 times in 4,000 refills. In our experience one fatal case and 4 other minor ones were met with.

5. Do you continue pneumothorax after this occurrence? Ans. The general reply was as a rule "yes", but not before an interval of 2 or 3 days, and then after the administration of a sedative. The definition of pleural shock seems very uncertain. Many so-called cases of fainting or other nervous collapse no doubt have been confused with it. The type I am referring to, however, is the one in which a true syncopal attack occurs with arrest of the heart and respiration and total unconsciousness lasting for a prolonged interval, necessitating artificial respiration and cardiac stimulation. This, in my opinion, warrants permanent interruption of the pneumothorax treatment.

Summarizing the above reasons for abandoning pneumothorax, it seems to me that the commonest are ineffective collapse and persistence of fluid. In looking over many of our cases, the question arises whether it would not be better to give these up at once when either of the two above conditions are found, instead of struggling on more or less indefinitely in trying to stretch unyielding and inoperable adhesions and to replace persistent fluid by aspiration and air.

In reviewing the more recent literature on this subject the general opinion seems to be that the earlier the pneumothorax is performed, the better are the results both as regards dura-

tion and efficiency of treatment. The longer we wait, the more advanced the spread in the lung and the less efficient the subsequent collapse, the poorer is the prognosis, and the worse the ultimate result. It is much less a question of time in the maintenance of pneumothorax than one of the completeness and effectiveness of the collapse. Partial collapse which does not show signs of closure of cavities and the abolition of sputum, is of no service. Today, with the much more effective surgical measures at our disposal, it seems to be an injustice to the patient to have pneumothorax indefinitely prolonged.

As we all know, the attitude towards this form of treatment has undergone a complete reversal since the time of its first establishment over thirty years ago. It has been accepted as a universal method in such cases as do not readily respond to bed-rest. It now seems as though this method will have to yield to more effective if more dramatic surgical procedures. Its failure in unsuitable cases will always be evident, while its general use in the likely class of cases will give still more brilliant results than in the past; but in order to achieve these we will have to overcome those undesirable complications which materially interfere with its immediate success. After a definite trial, a case should show effective collapse, or else be passed on to the surgeon (Table I).

In presenting my figures, I would like to define "effective collapse" as that in which three things are definitely established: first, disappearance of symptoms; second, disappearance of bacilli—or, better still, of all sputum; thirdly, complete closure of cavities as shown on x-ray examination.

TABLE II.  
RESULTS OF PNEUMOTHORAX THERAPY

	<i>American Sanatorium Association Committee 1930-33</i>	<i>Rist 1912-26</i>	<i>Veran 1932</i>	<i>Sinding- Larsen 1937</i>	<i>Cold 1926-32</i>	<i>Packard 1932</i>	<i>Amberson 1930</i>	<i>Harper 1938</i>	<i>Aycock and Keller 1938</i>	<i>Leslie and Anderson 1937</i>	<i>Royal Edward Institute 1933-40</i>
Number of cases	396	759	226	158	106	105	165	83	530	595	222
Arrested or quiescent . . .	percentage 52.5	percentage 6.5 (45.5 at work with pneumo- thorax)	percentage 81 (6 with exu- date)	percentage 89.5	percentage 71.5 (some with pneumo- thorax)	percentage 58	percentage 47	percentage 29	percentage 30	percentage 71.2	percentage 57
Active disease . .	17.5	17.5	13		28.5	19	22	42	62	14.5	17
Dead . . . . .	30 or missing	30.5		10.5		23	31	29	8	14.3	23; missing 3



Included in the term "arrested" there are also those who strictly speaking should be termed "quiescent" cases, that have for at least a year or more shown no active signs of disease clinically or by x-ray examination, and who presumably, in the majority of cases, are able to do ordinary limited exercise.

I have also compiled a Table showing comparative figures as gathered in the more recent literature, showing the results published by various authorities on different numbers of cases of pneumothorax therapy. These vary in the time elapsed since the cessation of treat-

ment from 1 to 15 years. The figures of our cases at the Royal Edward Institute are added for comparison.

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## FURTHER OBSERVATIONS UPON THE TREATMENT OF CONVULSIONS BY DILANTIN SODIUM\*

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THIS article is a continuation of the observations published last year<sup>1</sup> upon 25 children with convulsions treated for six months by dilantin sodium. This analysis has been made after an average of 18 months' treatment under the same conditions. Five children were treated for 12 months, 6 children for 15 months, and 14 children for 18 months or longer. The duration of treatment was dependent upon the onset of therapy and upon its termination in those cases where the children were discharged to institutions or to adult hospitals.

These children were taken from the Out-Patient Department of the Hospital for Sick Children, Toronto. The convulsions were of varied origin. In four children they were due to cerebral agenesis, in two to cerebral birth injuries, in one to encephalitis, in one to cerebrospinal lues, and in seventeen they were idiopathic in origin. Sex-incidence was almost equal. Twelve children were male and thirteen female. The ages of the group at the beginning of treatment were as follows: under four years, one; between four and eight years, six; between eight and twelve years, eleven; and over twelve, seven.

The usual dosage was 0.05 or 0.06 grams three times a day for children under six; and 0.1 gram three times a day for those over six. Phenobarbital in amounts from 0.5 to 1.0 grains three times a day was added in a number of the re-

spond the dilantin sodium was increased to 0.1 grams three times a day for children under six and 0.1 gram five to six times a day for those over six. In four others a modified ketogenic diet was instituted.

The cases were considered under four groups: (1) those in which convulsions of the grand mal type were definitely predominant; (2) those in which convulsions of the petit mal type were definitely predominant; (3) those in which the two types were combined without predominance; and (4) an intermediate group in which the individual had loss of consciousness and clonic movements of a localized group of muscles.

The following results were obtained (Tables I and II). In the controlled cases the attacks were abolished or occurred at infrequent intervals. The results are not so good as those

TABLE I.

RESULTS OBTAINED IN THE VARIOUS TYPES OF  
CONVULSIONS TREATED BY DILANTIN SODIUM  
FOR A PERIOD OF 18 MONTHS

Results obtained	Grand mal type	Combined type	Petit mal type	Localized type
Controlled .....	7	2	3	2
Not controlled ..	3	2	4	2

TABLE II.

COMPARISON OF THE RESULTS OBTAINED IN THE TREATMENT OF CONVULSIONS BY PREVIOUS METHODS OF THERAPY, WITH THE RESULTS OBTAINED AT THE END OF 6 AND 18 MONTHS' TREATMENT WITH DILANTIN SODIUM

Results obtained	Previous therapy percentage	Dilantin therapy Six months percentage	Dilantin therapy Eighteen months percentage
Controlled .....	40	72	56
Not controlled ..	60	28	44

\* From the Hospital for Sick Children, Toronto, and the Department of Paediatrics, University of Toronto, under the direction of Alan Brown, M.D., F.R.C.P.(Lond.).

fractory cases. In some children who did not

obtained after six months' treatment, although the difference is not great, four cases showing a relapse. In three of these children the convulsions were not controlled, but the results of therapy were still better than those obtained by previous forms of treatment. In the fourth case the frequency of the attacks returned to former levels.

Increasing the dosage to higher levels did not prove of value. The larger dosages made no demonstrable change in the frequency of the attacks.

Those children placed on the ketogenic diet were given in addition to their medication a diet in which the ratio of the fatty acid components to the glucose components was 3.5 to 1. These children did not adhere closely to their diets at home and their urine showed only a trace of ketones when examined in the Out-Patient Department. On this obviously modified diet the following results were obtained. One case showed a marked improvement, the attacks decreasing from one hundred a month to fifteen or less. Another showed a sharp decrease in the attacks but has not been followed long enough to be certain that the improvement will be maintained. Another showed a slight but definite improvement over a long period. The fourth showed no definite improvement. It would seem a wise procedure to try all refractory cases upon a period of ketosis as a number of these cases might be benefited.

In these children no further toxic reactions were noted during the longer period of treatment. Two children continued to have a sharp threshold above which an increase in medication produced a definite ataxia.

A survey was made to find the effect of prolonged dilantin sodium administration upon the hæmoglobin, urine and plasma ascorbic acid. Unfortunately no investigation was done on these children before the onset of therapy and the results obtained after treatment had to be compared with normal values for children of the same age and social status in the community.

**Hæmoglobin.**—The Sahli hæmoglobinometer was used and 13.8 grams of hæmoglobin per 100

c.c. of blood was considered as the standard for a hæmoglobin of 100 per cent.

The results showed 1 child with a hæmoglobin between 60 and 69 per cent, 7 children between 70 and 79 per cent, 12 between 80 and 89 per cent and 5 over 90 per cent. The average was 81 per cent, or, translated into grams of hæmoglobin, 11.2 per 100 c.c. of blood. This corresponds moderately closely to the results obtained by Summerfeldt and Ross<sup>2</sup> upon children from working-class homes of Toronto. Their figures were 11.5 grams per 100 c.c. of blood for children between five and ten and 12.0 grams per 100 c.c. of blood for children between

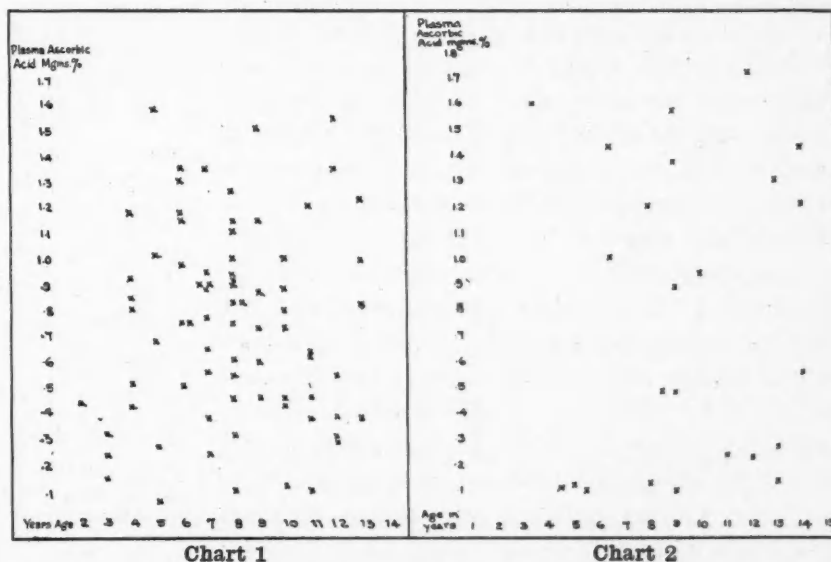


Chart 1.—Milligrams of ascorbic acid per 100 c.c. of plasma in children 2 to 14 years of age on admission to hospital (Snelling and Jackson). Chart 2.—Milligrams of ascorbic acid per 100 c.c. of plasma in twenty-five children treated with dilantin sodium for an average period of eighteen months.

ten and fifteen. The average for a group of twenty-five with an age distribution comparable to this series would be 11.7 grams per 100 c.c. of blood. The difference is slight, and it appears that the prolonged administration of dilantin sodium produces no definite change in the hæmoglobin.

**Urine.**—Routine urinalyses showed very few abnormal findings. Only one showed a slight amount of sugar, two showed a positive test for albumin, and three showed a moderate number of pus cells. It appears therefore that the prolonged administration of dilantin sodium does not produce any constant or characteristic changes in the urine.

**Plasma ascorbic acid.**—In an early paper Kimball<sup>3</sup> suggested that the toxic hypertrophy of the gums had a scorbutic origin. Further investigations have not confirmed this. Merritt and

Foster<sup>4</sup> in a recent paper state that the administration of dilantin sodium had no effect on the absorption or utilization of ascorbic acid.

The values for plasma ascorbic acid in normal persons depend upon the technique of the investigator. Snelling and Jackson,<sup>5</sup> whose technique was used in our series, give a wide range for the normal child from two to fourteen years of age. Seventy-seven children admitted to hospital for various illnesses showed a range from 0.1 to 1.6 mg. per cent, with an average of 0.75 mg. per cent (Chart 1). The children with the lower readings showed no evidence of scurvy. Bottle-fed infants given an adequate daily amount of orange juice showed levels from 1.0 to less than 0.1 per cent. These children showed no evidence of scurvy in spite of the low levels of plasma ascorbic acid. It appears therefore that a single examination of the plasma ascorbic acid cannot be considered as diagnostic of the vitamin storage of the body nor can it be considered as a standard for the diagnosis of scurvy.

The results obtained in this series are shown in Chart 2. The average of this series was 0.78 mg. per cent plasma ascorbic acid. This corresponds closely to the figures of 0.75 mg. per cent obtained by Snelling. It appears that dilantin sodium does not lower the plasma ascorbic acid of the series when considered as a group.

There was no constant relationship between the levels of ascorbic acid and the hypertrophy of the gums. Two cases showing marked hypertrophy had an average value of 0.12 mg. per cent; three with moderate hypertrophy showed an average level of 0.86 mg. per cent; and three

with slight hypertrophy showed an average of 0.27 mg. per cent. In addition, one case with moderate hypertrophy had a level of 1.43 mg. per cent and several cases with no hypertrophy had levels around 0.12 mg. per cent.

#### CONCLUSIONS

1. The treatment of a series of convulsive children by dilantin sodium for an average period of 18 months shows some change from the results obtained after six months of treatment. Several cases showed an increase in their convulsions but most children remained unchanged.

2. Increasing the dosage above 0.05 or 0.06 grams three times a day for children under six, and above 0.1 gram three times a day for children over six did not produce an improvement in the results.

3. The addition of a modified ketogenic diet proved definitely beneficial in several cases.

4. The administration of dilantin sodium did not produce any definite changes in the hæmoglobin or urine.

5. The administration of dilantin sodium did not produce any constant changes in the plasma ascorbic acid. There seemed to be little relationship between the hypertrophy of the gums and the blood ascorbic acid levels.

We should like to thank the Parke Davis Company of Walkerville, Ont., for their very generous supply of dilantin sodium for use in this study.

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### SUBACUTE MYOCARDIAL INFARCTION OR NECROSIS

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IF we subject the problem of myocardial infarction to a critical examination we can distinguish the following forms: (1) a typical form of acute myocardial infarction, with characteristic symptoms; (2) an atypical form of acute myocardial infarction, without all the characteristic symptoms, yet with an acute onset. This form also includes all cases with atypical localization of cardiac pain. Both forms have one aspect in common, namely, an alarming and sudden beginning, occurring mostly at rest. (3) An atypical form which is not only atypical in so far as its symptoms are

concerned but also in that myocardial necrosis develops gradually, unlike the other acute forms. The intention of this short paper is to stress the importance of the last type, which in my opinion, deserves to be treated as an entity by itself and to be called "subacute myocardial infarction or necrosis".

There are definite clinical, anatomical, and physio-pathological considerations which justify this separation from the other forms as well as the terminology adopted. Although the clinical symptomatology is often overlooked or passes unobserved, by carrying out certain



laboratory tests attention is focussed upon these minor symptoms, and such then are of great value in assisting us to make an early diagnosis.

This form, commonly known as "coronary thrombosis without pain" is generally discovered either by an accidentally taken electrocardiogram or at autopsy in persons without any history of a major coronary involvement. But coronary thrombosis without pain occurs in most cases with an acute onset and has therefore to be grouped under our form 2. As N. Smith Davis<sup>1</sup> has pointed out, coronary thrombosis without pain is characterized "by an abrupt onset of dyspnoea, which may be paroxysmal or continuous, and is unprovoked by exertion, and by shock, lowered blood pressure, disordered or weakened heart action, fever, leucocytosis, pericardial friction or embolic complications". The incidence of this group is given by this author as reaching 40 per cent, and does not include the cases of sudden death without previous history. From this description the acute character of the onset, although pain is absent, stands out clearly.

The underlying basis of the above proposed classification is supported, too, by the anatomical observations and physio-pathological considerations of Blumgart and his associates.<sup>2</sup> Many authors have described the presence of intercoronary anastomoses in cases of coronary disease, but, in my opinion, Blumgart, etc., first recognized the great importance of these in the pathogenesis of angina pectoris and coronary thrombosis. The development of the collateral circulation is the result of narrowing or obstruction of a coronary vessel, and is to be considered a *compensatory* factor which should guarantee an adequate blood supply for the ordinary activities of the heart. It further results, according to their observations, that decreased coronary blood flow may occur as a direct consequence of increased cardiac work without spasm of a coronary artery, and that angina pectoris is the result of a paroxysmal, relative myocardial anoxæmia. The absence of coronary thrombosis in a few cases of myocardial necrosis led to the assumption of a new mechanism of its production, namely, that the myocardial ischæmia may be so prolonged as to lead to the necrosis. Sometimes, however, by rest or other factors which reduce cardiac

work, the process may be inhibited at an early stage.

To synopsise. In cases of advanced coronary sclerosis and stenosis adequate blood supply to the heart for normal purposes is maintained by the development of a sufficient collateral anastomosis. An undue increase in cardiac work makes the latter insufficient and creates a disproportion between the demands and needs of the blood supply to the heart. This is not only the pathological basis of angina pectoris but also of the subacute form of myocardial infarction.

When an organizing thrombus of a coronary vessel, associated with myocardial necrosis or infarction, is found post mortem in a patient without a history of a major coronary involvement such may not have been caused directly by the thrombus itself but be the consequence of failure of the concomitant collateral circulation. On account of the above method of production it is evident that the clinical picture will not show an acute onset like the two forms first described, in which direct sudden occlusion is responsible, and no shock will be manifested. The symptoms will be by no means characteristic.

#### CLINICAL SIGNS AND SYMPTOMS

Great importance must be given to the history of these cases which reveal an anginal syndrome or equivalent symptoms (dyspnoea, etc.) of some duration. In them some symptoms, suggestive of a coronary artery involvement, are usually detectable. They can be classified into two groups: (1) symptoms in cases with manifest signs of heart failure; (2) symptoms in cases without manifest signs of heart failure.

*Group 1.*—Belonging to this group, a sudden development of restlessness may be the only symptom found in some cases, but on careful examination a gradual fall of blood pressure, dyspnoea while at rest, œdema, leucocytosis, and characteristic cardiographic changes can be elicited. The latter two are dealt with fully later. In other cases a strange feeling of nausea or fatigue may be the only sign of the morbid process.

*Group 2.*—Here, sweating, which is one of the outstanding symptoms of typical cases of acute coronary obstruction, and weakness, sometimes accompanied by fever of unknown origin, are strongly suggestive of subacute myocardial infarction or necrosis.

A symptom noted by the author in a few cases is shortness of breath with a heavy

sensation over the precordium lasting a brief time, or shortness of breath with palpitation while at rest.

Substernal pain, which is present in some cases, tends to assume a growing intensity, reaching its peak in one or more days. In this regard a careful history reveals that the new sensation of pain differs somewhat from those previously experienced, being more fearful and ominous. The importance of a properly taken history cannot be stressed enough, as the patient often forgets to mention his attacks of previous fleeting distress.

It is once more emphasized that the above clinical symptoms are by no means characteristic and that a positive diagnosis can only be properly made by recourse to laboratory tests, of which the following are the most useful.

**Electrocardiographic changes.**—The electrocardiographic picture here is also of the acute myocardial infarction type, but instead of appearing in a few hours is delayed for three to eight days. This agrees with pathological findings of a gradual onset of the necrosis. In the interval before the appearance of the typical changes minimal alteration of the electrocardiogram is visible and should be interpreted in the light of further developments. In consequence, the necessity of repeated tracings is emphasized. These delayed changes are, thus, considered characteristic of subacute myocardial infarction. S. Strauss<sup>3</sup> has recently reported such in coronary occlusion, but concluded that electrocardiographic examination alone is not sufficient to confirm or to detect the occurrence of coronary occlusion. But four out of his five cases gave a history as out-

lined above, indicating that they belong to the subacute myocardial necrosis group.

**Leucocytosis.**—A polymorphonuclear leucocytosis is present in the great majority of cases, and may be the only positive sign where no electrocardiogram is available.

The value of separating the subacute group from the acute cases of myocardial infarction is that it enables an earlier diagnosis to be made, and, by allowing one's patient to rest in the "latent" period, even prevents the development of the necrosed area of heart muscle or limit it. This may improve the already poor prognosis.

#### CONCLUSIONS

Myocardial necrosis without typical symptoms or an acute onset, which can be detected by delayed electrocardiographic changes of coronary occlusion type, is described as a clinical entity under the title of subacute myocardial infarction or necrosis.

The mechanism of its production and the clinical symptoms and signs, justifying it as an entity, are discussed. The symptoms are so atypical that the patient often continues his regular activities, to his own detriment.

The delayed appearance of electrocardiographic changes are in accord with the clinical picture, and may only be discovered accidentally some time later.

The importance of a careful history in aiding the detection of cases of subacute myocardial infarction or necrosis is strongly stressed.

A raised leucocyte count may be the only positive sign in the cases outlined.

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One of the lessons learnt in the last war and which it is suggested may be in danger of being forgotten in this one is that human beings are not machines which can produce a steady output no matter how long they are kept going. A recent Medical Research Council (Industrial Health Research Board) Emergency Report deals with this matter in connection with the furtherance of the national effort. It advises the avoidance of over-long hours and of continuance of work without intervals and suggests that Sunday rest

and ordinary holidays should be given. Other desiderata for enabling workers to put out their maximum effort are stated to be: (1) the alleviation of boredom by varying work or even providing some such distraction as music; (2) the elimination of unnecessary movements and effort at repetition processes; (3) the provision of good lighting and satisfactory heating and ventilation; (4) the supervision of inexperienced workers and the placing of the "accident prone" on safe work.—*J. Roy. Inst. of Pub. Health & Hygiene*, 1941, 4: 165.

## PARESIS OF THE LARYNX

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TO the laryngologist the larynx is a very intriguing organ. The anatomy, especially the neuromuscular mechanism, has been the subject of much research by many noted men down through the years. The first of these was Galen, who about 200 A.D. found that bilateral sectioning of the recurrent laryngeal nerves in animals caused respiratory distress and aphonia.

The larynx is the seat of many pathological lesions, and of these, paresis is one of the most interesting. In order to appreciate the various types of paralysis which one may find it is necessary to have a clear mental picture of the intrinsic muscles of the larynx, their nerve supply, and their action. The muscles are divided into three groups, those that close, or adduct, the vocal cords, those that open, or abduct, the cords and those that tense them.

The adductors are: (a) arytenoidei (unpaired); (b) crico-arytenoidei lateralis (pair); (c) thyro-arytenoidei (pair).

The abductors are: crico-arytenoidei postici (pair).

The tensors are: (a) crico-thyroidei (pair), fixers of the cricoid and thyroid cartilages; (b) thyro-arytenoidei (pair), fixers of the edge and supportive tissue of the cords.

The nerve supply is from the vagus and consists of the superior laryngeal nerves and the recurrent laryngeal nerves. The external branches of the superior laryngeal nerve supply the crico-thyroid muscle. The remaining laryngeal muscles are innervated unilaterally by the recurrent laryngeal nerve. The inter-arytenoid muscle, being in the midline, is innervated by both the right and left recurrent laryngeal nerves. There has been much investigation and controversy as whether the arytenoid does or does not receive a motor branch from the internal ramus of the superior laryngeal nerve. Lemere<sup>1</sup> studied 2,000 serial sections of the larynges of two babies, staining them for nerve fibres and thus reconstructing the course of the nerves. He states definitely that the nerve fibres do not end in the muscle, but pass on through to the mucosa of the larynx. He also states that no one has ever

produced contraction of any of the laryngeal muscles except the crico-thyroid by stimulation of the superior laryngeal nerve. This I think is the generally accepted view. Dilworth<sup>2</sup> and some other investigators, however, believe that the arytenoid does receive a motor branch from the internal ramus of the superior laryngeal.

The right recurrent laryngeal nerve passes in front of and beneath the subclavian artery and returns along the side of the trachea before reaching the larynx. The left passes in front of and beneath the arch of the aorta. It also ascends along the side of the trachea to the larynx. No adequate explanation has ever been given for the peculiar and hazardous course of these nerves. Lahey and Hoover<sup>3</sup> have shown that occasionally the recurrent nerves do not descend but pass directly across from the vagus beneath the lowest fibres of the inferior constrictor to enter the larynx. Russell<sup>4</sup> has shown that the abductor and the adductor filaments exist in separate bundles of fibres in the recurrent laryngeal nerve. On stimulating the recurrent nerve it has been found that the abductor muscles lose their excitability much sooner than the adductors. This is called Semon's Law. Dr. Chevalier Jackson says this should be called Semon's Rule, as there are exceptions to it. New<sup>5</sup> reports a clinical case demonstrating Semon's Law. The patient had chronic anterior poliomyelitis with bulbar involvement. When the patient phonated repeatedly the abductors ceased to function entirely on one side and only partially on the other. After a rest of ten minutes the cords again functioned normally.

We are now ready to discuss the various types of laryngeal paralysis. The lesions producing the paralysis are either central or peripheral. The cortical centre for the larynx is bilateral, and for this reason it is generally agreed that a unilateral cortical lesion cannot produce paralysis of the larynx. In other words central lesions producing paralysis must be in the bulb. Such lesions may be due to syphilis, multiple sclerosis, syringomyelia, or progressive bulbar paralysis.

*Adduction paralysis of the larynx* means an impairment of closing movements due to im-



paired innervation. As a primary lesion it is extremely rare because it would have to be a very minute lesion indeed that would select only the adductor fibres in the recurrent nerve or bilateral minute central areas from which such fibres are believed to emanate. However, it is common as a terminal condition in the cadaveric state of complete paralysis where there is also abductor and tensor involvement. The chief cause is syphilis. It may be part of the picture in bulbar lesions, in disseminated sclerosis, and syringomyelia. It may be the result of toxic conditions such as may occur with diphtheria, alcoholism or lead poisoning.

In diagnosing the condition one notes that if the lesion is unilateral the unaffected cord moves to the midline, but the involved cord remains in the inspiratory position. If the lesion is bilateral both cords remain in the inspiratory position when the patient attempts to phonate. This condition must be differentiated from hysterical aphonia and mechanical fixations of the crico-arytenoid joint. In the former the patient may suppress any movement of the cords when asked to say "E", but when asked to cough the cords will approximate, thus proving there is no paralysis. If there is a question of the latter condition it is necessary to do a direct laryngoscopic examination, and with a closed forceps demonstrate whether the cord is motile or not. As far as treatment is concerned it is mostly a matter of diagnosing the condition and treating the cause if possible. If a cord does not return to function within four months in an adult it is very unlikely to do so. Adductor paralysis is a serious condition as the liability of secretions entering the trachea is greatly increased and the ability to expel them is decreased.

*Abductor paralysis of the larynx* means the failure of the glottis to open owing to lack of motor impulses normally transmitted by the recurrent laryngeal nerve. This paralysis may be unilateral or bilateral, median or cadaveric. This type of paralysis, especially the unilateral, is much more commonly seen than the adductor paralysis. This is largely due to the peculiar course of the recurrent nerves, as mentioned previously. The causes of abductor paralysis, unilateral or bilateral, are many; such as aneurysm, tumours, (malignant or benign), hæmorrhage, goitre, trauma, thickened pleura, pericardial effusion, dilatation of the left auricle, systemic infections, such as diphtheria,

metallic poisons, usually lead. Diseases of the central nervous system such as disseminated sclerosis and tabes dorsalis, may also be a cause. A certain percentage are due to injury during goitre operations. For this reason it is becoming more and more common to be asked to check the cord movements before a thyroidectomy. The patient may have a very good voice with one cord paralyzed. If the surgeon knows that one cord is already damaged he will be specially careful to guard against damage to the opposite side. In the majority of cases where both recurrent nerves are damaged during a goitre operation the cords swing to the midline and the patient may require an emergency tracheotomy. In some cases they assume the so-called "cadaveric position", and for the time being they have a fairly good airway. Unfortunately in a varying length of time this usually changes to a midline position. There is no satisfactory explanation for this change. Paralysis in the midline position does not mean paralysis of phonation. The crico-thyroid muscles still function and the patient has a fairly good voice.

Unilateral abductor paralysis is not a serious condition as far as the function of the larynx is concerned. As a rule the affected cord is in the midline, and this leaves an ample airway. When the cord remains in the "cadaveric position", the unaffected cord gradually becomes educated to swing across the midline, thus meeting the affected cord, and the voice will be very good. Unilateral abductor paralysis requires no local treatment.

As regards the treatment of bilateral abductor paralysis the emergency cases are no problem, because one is forced to do an immediate tracheotomy, but those patients who cannot even be normally active because of their limited air intake present a real problem. Their inspiration becomes stridorous. They soon learn to limit their activities; for example they learn to walk at a very set rate.

One of my earliest patients in Hamilton was a woman who had a bilateral abductor paralysis. She managed fairly well until she became pregnant. Her oxygen intake was then far below her increased metabolic requirements, and she lost weight rapidly. A low tracheotomy was performed. She very promptly gained weight, went through her confinement without difficulty, and has since done all the work of her household without help. She is

quite contented to wear the tube. This is a simple but rather disfiguring method of relieving these cases. Of course it is necessary for them to place their finger over the end of the tube to talk. It is not necessary to do this if they wear a Tucker tube, which has a valve. The desire to get away from the tube has been the incentive to devise other methods of relieving this condition. Some of these are nerve suture (which has never been successful), cordotomy or cordectomy, ventriculo-cordectomies, of which there are many modifications, and cord displacements. The submucous resection of the vocal cord as described by Hoover<sup>6</sup> was successful in 75 per cent of his cases as far as providing an ample airway, but in order to obtain the air space the voice had to be greatly sacrificed.

King<sup>7</sup> has recently devised a new and very clever operation for the relief of this distressing condition. He has used it only in those cases where the nerves were injured during a thyroidectomy. He utilized the omohyoid muscle. This is an extrinsic muscle of the larynx, and, as he says, it is already educated in respiratory and phonatory movements. He attaches this muscle to the posterior portion of the arytenoid cartilage. If the trouble has been of long standing he has to do some reconstructive work on the larynx, such as immobilizing the crico-arytenoid joint and freeing fibrosed muscles. This gives controlled abduction of the cord, and, strange to say, there is also adduction. This gives the patient a good airway and preserves the voice. The operation is difficult technically, but for those of you who live in centres where there is ample cadaveric material it seems to me that it would be worthwhile mastering the technique. King worked it out on cows as well as cadavers. Financially it does not seem to be very profitable. Dr. King has done nine or ten cases, and so far has collected about thirty-five dollars.

Tensor paralysis is rare. When the cricothyroid muscle is involved the cord comes to the midline, but is lax and somewhat wavy in appearance. In paralysis of the thyro-arytenoid the cord is curved considerably away

from the midline, thus producing a husky voice on phonation. Recently such a case came under my observation. He had a persistently husky voice and his physician thought that he might have carcinoma of the larynx. He has bilateral involvement. No etiology has been discovered in this case. In a fairly large percentage of cases of vocal cord paralysis the cause cannot be determined.

#### CONCLUSIONS

1. Adductor paralysis, either unilateral or bilateral, interferes with all the functions of the cords. Interference with the phonatory function is inconvenient, but interference with the protective and expectorative function renders the individual more susceptible to pulmonary disease. There is no local treatment for this condition.

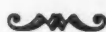
2. Unilateral abductor paralysis is not serious in itself. The patient will have a reasonably good voice with the cords either in the midline or cadaveric position.

3. In bilateral abductor paralysis the voice is usually fair, but there is serious interference with the respiratory function, unless the cords remain in the cadaveric position, which is unusual. Some cases require an emergency tracheotomy. Nearly all require some type of operation to increase the air space within the larynx.

4. King has devised a new and successful operation for this condition when it occurs following operations for goitre.

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## SULFATHIAZOLE ANURIA WITH RECOVERY\*

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PATIENTS receiving sulfathiazole commonly show signs of renal involvement. These usually consist of hæmaturia, oliguria, urgency and nitrogen retention. Anuria is said to occur in 0.7 per cent of treated cases. Crystals of the acetylated form of the drug often may be found in the urine but produce no signs or symptoms. Microscopic hæmaturia requires increased vigilance. Macroscopic hæmaturia, especially with oliguria, requires immediate discontinuance of the drug. Fatal cases have shown yellowish orange crystals in the pelvis, ureters and urinary bladder producing obstruction and anuria. Pre-existing calculi have been found with an added content of acetylated sulfathiazole. Previous renal damage may increase the incidence of renal complications when sulfathiazole is used.

The following case is of interest because a small amount of the drug produced anuria in a previously healthy woman.

Mrs. I.Z., a Rumanian Jewess of sixty, was admitted to the Toronto Western Hospital on January 10, 1941, because of nausea, vomiting, pain in her loins, and a constant unsuccessful desire to urinate.

Her previous health was excellent, except for irrelevant minor illness and operations. Three weeks before admission she had tonsillitis and a "cold". The symptoms persisted despite home treatment for two weeks, and an aching pain in the left lower "chest" appeared. Later she had fever, cough, and malaise and called her doctor at 11 p.m. January 8th, when a diagnosis of bronchopneumonia was made.

She was given two tablets of sulfathiazole every four hours. There was a minor degree of nausea and malaise after the 6th dose. After taking the 7th dose (7 g. in all) the nausea increased and she passed smoky urine and stopped the drug. She had constant desire to urinate, and until her admission 20 hours later stated she had passed only about a teaspoonful on two occasions.

On admission she seemed worried and apprehensive but not acutely ill. She had abdominal distension and tenderness, and was also very tender over both loins, with a blood pressure of 160/74. On catheterization we obtained 3 c.c. of dark urine containing blood and crystalline deposits. Her blood contained 5.1 mg. free and 9.1 mg. total sulfathiazole; non-protein nitrogen 43 mg. Intravenous administration of glucose saline, sodium bicarbonate and aminophyllin, enemata, and

heat, all were without apparent effect. About 3 or 4 c.c. of urine was obtained (catheter) 3 hours after admission; none in the next 12 hours. At this stage the non-protein nitrogen of the blood was 45 mg., CO<sub>2</sub>, 57.9 vol. per cent and her clinical state was unchanged.

Cystoscopic examination with novocaine spinal anaesthesia showed a yellow-orange spherical concretion about the size of a pea projecting from the left ureteral orifice. This was removed and a ureteral catheter inserted with some difficulty, finally reaching the pelvis. A copious flow of urine containing yellowish grey sediment followed. The right ureter was also obstructed, although no concretion was seen at the orifice. This was treated in the same manner with the same result. A catheter was placed in the bladder and all three retained for three days. The pelvis were flushed with sterile water every two hours during the day. Fluids were forced and a good diuresis resulted. During the first 24 hours the ureteral urine contained 108.2 mg. free and 357.0 mg. total sulfathiazole. The bladder urine in the same period contained 113.0 mg. free and 495.0 mg. total sulfathiazole. The drug continued to be excreted in varying amounts for 18 days. The total excretion during the first four days contained 0.6944 g. of the drug in the free form and 2.4 g. as the total excretion. The urea clearance on this day (14th) was 51.4 per cent. The calculus removed contained 86.6 per cent acetylated sulfathiazole.

On January 19th, 8 days after cystoscopic examination, she had intense urgency, soiling the bed on frequent occasions. Her temperature rose to 103°; the centrifuged urine contained pus cells and blood in small amounts. Potassium citrate gave relief. The urine culture showed a mixed growth of *Esch. coli* and *S. fecalis*. This complication disappeared after a week of treatment. Her urea clearance, January 31st, was 58 per cent normal. The centrifuged urine of the same date still contained small numbers of pus cells (20 to 50 per high power), and culture showed the same organisms as before. On this date she felt perfectly well, was up, and awaiting discharge.

This case demonstrates the dangerous consequences that may follow the administration of even small doses of sulfathiazole. If persistent oliguria of 500 c.c. or less or anuria occurs early urological investigation is necessary. This should be done under spinal anaesthesia. Ureteral irrigation can safely remove quantities of obstructing debris. Recurrence of obstruction with infection may occur later, since it apparently requires a considerable period to ensure the final disappearance of crystalline deposits.

We wish to express our thanks to Mr. S. Wilson for the chemical determinations.

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## PREVENTION — THE TREATMENT OF CHOICE IN PULMONARY EMBOLISM\*

By J. ERNEST AYRE, M.D.

*Montreal*

PULMONARY embolism all too frequently becomes a major post-operative disaster. When the surgeon attempts to explain to relatives the cause of death a frequent statement might be "it is just one of those things over which we have no control". Such a statement must be considered false. The truth is, that something can be done to prevent these shocking deaths. In one series which I will mention later the incidence was reduced to one-fifth through prophylactic management. Prevention is the most effective form of treatment at our disposal, as, granted, there is so little that one can do to appease death once embolism has become a reality.

Some time ago I saw a patient of 30 years develop embolism. She was a healthy, recently married woman with a large fibroid complicating early pregnancy. She was very eager to have a child. Therefore a myomectomy was performed. Recovery was uneventful until the 12th day when the patient was allowed up. Until that time the results of the operation seemed to be highly gratifying. No miscarriage had developed. There had been little febrile reaction. She was suddenly seized with a pain in the chest on leaving her bed and died a few minutes later, a victim of embolism.

This case produced a profound impression upon me and I began to wonder whether more could not be done to prevent such tragedies. It is obvious that the time for effective treatment to begin is before the thrombus forms, rather than to wait until thrombosis has developed or until the clinical phenomenon of embolism has proved the gravity of the situation. While the object of this paper is to deal primarily with treatment of embolism, it is axiomatic that its etiology should be understood in order to treat it efficiently. Foremost among etiological factors are circulatory stasis and low-grade sepsis, the stasis chiefly found in the veins of the dependent extremities and pelvis. Of secondary importance are surgical trauma and changes occurring in the blood, *viz.*, secondary anaemia, hyperglycaemia and dehydration. Heart disease must also be considered a factor leading to circulatory stasis. The administration of digitalis will be helpful when indicated pre-operatively or antepartum in these cases.

It is my opinion that thrombo-phlebitis and embolism are much more frequent than diagnosed. Probably many dying of so-called "heart-failure" actually die of embolism. Goodall<sup>1</sup> is of the opinion that every acute pain in the chest during the puerperium or subsequent to operation, is embolic in nature until proved otherwise. This opinion is shared by Ducuing,<sup>2</sup> who states that most cases of post-operative stitch-in-the-side, pleurisy or other chest complications are embolic in origin. Therefore the conclusion must be accepted that embolism is an every-day occurrence.

The gynaecologist should be constantly on the "qui vive" to the threat of embolism. Over 50 per cent of fatal embolism occur following pelvic operations. Indeed in most gynaecological hospitals embolism is by far the most frequent cause of death (Wharton<sup>3</sup>). Uterine fibroids are the most common indication for hysterectomy, and abdominal hysterectomy for this condition is considered to present the most hazards for thrombosis and embolism.

Textbooks state that in any slowing of the circulation the leucocytes and platelets assume a marginal position. Stagnation of blood alone will not produce an agglutination of platelets or their fixation to the vessel wall unless other factors operate. Nevertheless, stasis is one of the most important, and yet most readily controllable, factors in post-operative thrombosis. This was first recognized by Virchow,<sup>4</sup> who was the great protagonist of the theory of venous stasis in the etiology of thrombosis and embolism.

It is said that embolism is on the increase. Nowadays, with modern luxurious therapy and nursing care, the special nurse is apt to do almost everything for the patient. The patient lies propped up in a half-sitting posture with the knees drawn up resting on a pillow. Therefore, the drainage from the femoral vein is slow. Light breathing and intestinal distension, coupled with a tight binder and motionless rigidity all favour stasis in the veins of the pelvis and lower extremities.

Some illuminating work has been done by Frimann-Dahl<sup>5</sup> demonstrating the extent to which venous stasis actually occurs in post-

\* From the Wards and Research Laboratory, St. Mary's Hospital, Montreal.

operative and bed-ridden cases. Using a radio-opaque dye injected into the saphenous vein he measured the time taken for the vein to be emptied in pre-operative, post-operative, and bed-ridden patients. The results were as follows. The normal emptying time was 5 to 30 seconds; in the bed-ridden cases this was prolonged to 1 to 2 minutes; and in the post-operative cases to 3½ to 4 minutes. Therefore, a marked retardation in emptying occurred in both the bed-ridden and post-operative cases, in the latter being much more pronounced. In the operative group retardation was noticed on the day following operation and gradually increased to the 5th or 6th day. Therefore, efforts to prevent stasis should commence on the first day post-operatively instead of waiting until the 5th day, when the patient begins to feel like moving about. In some of the above quoted cases the venous flow was almost stagnant up to the time when the patient first got up.

When embolism occurs it is believed that the clot usually originates in the pelvic, iliac or femoral veins and that in the majority of serious cases the thrombosis is of the occult type. Since many of these cases terminate fatally, it is quite possible that the clot became dislodged at an early stage before clinical thrombo-phlebitis had time to develop. While taking post-graduate study in London I was impressed by the relatively large number of cases of pulmonary embolism in one hospital. I attributed this to the stasis induced by the prolonged period spent in bed post-operatively, as compared with our routine here in Canada.

I believe the danger period comes during the healing-resting stage, beginning about the second or third day when the pulse quiets down and the operation reaction wears off. This is the time for action to prevent stasis, for this is the time the thrombus forms.

Embolism rarely occurs during frank sepsis, owing to the circulatory stimulation. It rarely occurs in the presence of hyperthyroidism, for the same reason. It may follow acute sepsis in the convalescent stage, after the strength and vitamin reserves of the patient are depleted. Therefore, thrombosis and embolism rarely occur if the blood is flowing rapidly, even in the presence of low-grade infection and even after extensive surgical trauma. Taure<sup>6</sup> has noted a seasonal incidence attributed to contagion of low-grade sepsis. The sepsis may only take the form of a cold or a sub-clinical attack of the

"flu". He believes it is chiefly during the changeable seasons of spring and fall that embolism occurs. That the sepsis may be of focal character is suggested by the fact that in many cases infection cannot be demonstrated clinically. When the chronic infected cervix is left behind in a sub-total hysterectomy, Goodall<sup>7</sup> has demonstrated that thrombo-phlebitis (and therefore possible embolism) occurs three times more commonly than when a total hysterectomy is performed. Goodall has long been a vigorous exponent of careful pre-operative investigation for latent diabetes. Diabetics are prone to develop thrombosis and embolism. Gaessler<sup>8</sup> states that the optimal condition for the occurrence of thrombosis is an increased absolute and relative fibrinogen and globulin value in the plasma with a concurrent rise in blood-sugar and lactic acid. The chief rôle in this is played by the carbohydrate change. In an infected puerperium the blood-sugar and lactic acid rise and the alkali reserve falls as the infection gains ground. It is important that the blood-sugar be kept within normal limits during the post-operative period. Many are found to possess an elevated post-cibal blood-sugar without glycosuria. These patients benefit from a single daily dose of 5 to 20 units of protamine zinc insulin post-operatively. This procedure guards against embolism, favours proper tissue healing, and improves the appetite by stimulating metabolism generally.

Obesity pre-disposes further to thrombosis and embolism. It may be that the reason for this is the low-basal rate so frequently associated, and the consequent sluggish circulation. In Goodall's clinic all patients having a low basal metabolic rate are treated both pre- and post-operatively with thyroid extract. The dosage should be governed by the clinical effect, sufficient being given to produce palpitation, then reducing to keep below this level. This has been found to improve circulation and healing and to reduce the tendency towards embolism.

Anæmia is frequently found in association with thrombo-phlebitis and predisposes to its development. Blood transfusion and the administration of the various hæmatopoietic agents are helpful in preventing thrombo-phlebitis in the anæmic patient. Where blood transfusions are indicated these should be given early post-operatively or post-partum before the circulatory stimulation resulting from the operation or the delivery has passed off. This factor is of special significance in the obstetric patient who has suf-



fered from hæmorrhage, shock and collapse at the time of delivery.

Concentration or dehydration of the blood, so liable to follow operations, is also recognized as an important factor in thrombosis and is believed to act by increasing the agglutinative power of the blood. Dehydration may be controlled by adequate saline infusions.

To reduce thrombosis and embolism Goodall deals with varicose veins two to four days pre-operatively. The limb involved is bound up tightly from toes to hip with elastoplast. This is not removed until the patient is again ambulatory, at which time further treatment may be rendered as indicated. This simple, though effective, procedure temporarily closes off the static venous channels improving circulation in the extremities. Even where phlebitis sets in post-operatively or post-partum the same treatment of binding the whole affected limb with elastoplast has been found effective not only in reducing pain but in preventing further spread of the infection. I believe this treatment lessens the tendency to embolism.

It was stated above that venous stasis is the most readily controllable major factor affecting embolism. I believe that the most effective single procedure in this control is the administration of systematic graduated post-operative and post-partum exercises as a daily routine. The usual advice given to move around in bed post-operatively is inadequate. It is too uncertain. Further, there is too much delay. Even if morphia need be given to prevent pain the exercises should start on the first day following operation. Confidence must be inspired in the patient and the assurance given that they will do no harm. A good part of the pain is due to fear and apprehension.

The exercises should consist of lifting the arms high over the head twenty times, and then raising each leg the same number of times. Of course during the first day or two the patient cannot elevate the limbs so often, but even after a day the arms can be raised a few times, while the legs can be drawn up to the body and then fully extended. By the fourth or fifth day the full course of exercises should be achieved. In this way not only is venous stasis prevented but muscle atrophy is diminished and recovery of strength is accelerated.

The use of post-operative exercises is not new but it has been sadly neglected. As early as 1913 Pool<sup>9</sup> advocated this procedure. Its great

importance as a factor in the prevention of deaths from embolism has been forcibly shown by the experience of Shaw and Richards.<sup>10</sup> In two separate hospitals, in wards under the care of the same gynæcologist (Shaw), admitting the same type of patient, with the same pre-operative and post-operative treatment, except that in one hospital graduated exercises were given and not in the other, this gynæcologist performed 1,635 consecutive operations in the hospital with graduated exercises with an incidence of fatal embolism of 0.06 per cent; while in the hospital without graduated exercises the same gynæcologist in the same 12 years performed 3,618 operations with an incidence of fatal pulmonary embolism of 0.304 per cent, a percentage five times as great as in the other group. The contrast is well shown graphically as follows:

<i>Hospital</i>	<i>Graduated exercises</i>	<i>No. of operations</i>	<i>Fatal cases</i>	<i>Percentage</i>
Manchester Royal Infirmary .....	given	1,635	1	0.06
St. Mary's Hospital (Manchester) ..	not given	3,618	11	0.304

That these exercises were administered over this 12 year period, is attributed to the faithful matron in charge at the Royal Infirmary. It appears that she had been told to institute these exercises, following which Mr. Shaw promptly forgot about the procedure. The exercises were continued however, as a routine order. Recently it was noted that embolism was more frequent in the one hospital, and the records were investigated in an effort to explain the cause. The only difference found was the regular administration of the exercises in the hospital with the low death-rate from embolism. It was concluded, therefore, that this was very strong presumptive evidence that the exercises were responsible for the lower incidence of embolism.

Schmid<sup>11</sup> has demonstrated that stasis can be effectively overcome by the simple procedure of elevation of the foot of the bed, in this way preventing pelvic venous stagnation. He reports a series of 500 serious gynæcological operations in which this procedure was employed, and in which there was not a single instance of thrombosis of the pelvic veins found and not a fatal case of embolism. In contrast to this is the series of 2,463 gynæcological operations performed before elevation of the foot of the bed was practised. In this group there were 81 cases of thrombosis (3.3 per cent) and 22 deaths from



pulmonary embolism (0.9 per cent). No other explanation for the improved results could be found by the author, because no changes were made in the hospital routine. In addition to the absence of thrombosis and embolism, another advantage of this position is the improved circulation, better breathing and disappearance of shock.

I have found that a satisfactory means of applying the principles involved is to elevate the foot of the bed ten or twelve inches for the first three days continuously, then, for half an hour three times daily until the patient is able to be out of bed. The elevating of the foot of the bed acts as a reminder for the exercises to be carried out, and the exercises are considerably facilitated by the new position of the bed.

In addition to exercise in bed, gradually increasing exercise out of bed is important as soon as healing permits. I believe more harm is done by keeping the patient flat on the back too long than by early mobilization. Rest is very essential for recovery from disease or injury, but it is surprising how quickly one develops a back-ache and sore muscles from too complete bed-rest. I believe that rest will be more beneficial where all muscles are given some active exercise, coupled with a minimum of exertion.

As another means of overcoming circulatory stasis by active muscular contraction, de Takats and Jesser<sup>12</sup> advocate the use of bicycle pedals mounted to the foot of the bed. The patients pedal for five minutes, three times daily, beginning on the third day. The results have been highly beneficial as venous stasis is overcome, muscles are activated and deeper respiration ensues.

In any case where a venous thrombosis is either manifest or suspected all exercise of course is contraindicated. Such an occurrence means that activity was too long delayed. In this case rest and the administration of heparin are indicated. Murray<sup>13</sup> has administered heparin to 125 patients suffering from thrombophlebitis. In addition to producing a rapid disappearance of pain and fever these cases were active and discharged after 4 to 8 days of treatment. When embolism has occurred and the patient has survived long enough to have heparin administered intravenously there has been striking clinical improvement. Of 46 cases so treated only two had further small embolisms and all patients recovered.

After pulmonary embolism, embolectomy is a heroic procedure not within the realm of practicability in most cases. De Takats and Jesser have found experimentally on dogs that 50 per cent may be saved if the vagi are cut or if atropine is given soon after embolism occurs. They advise the immediate administration of atropine and papaverine; the former in doses of 1/60 to 1/75 grains (0.001 to 0.0008 g.) and the latter in doses of one-half grain (0.03 g.) both administered intravenously. Atropine acts by blocking the vagal impulse while papaverine acts directly on the smooth muscle of the coronaries, producing relaxation. The size of the embolus causing death is frequently not large, but it is believed that it is not the obstruction of the bronchial tree that causes death so much as the widespread radiation of autonomic reflexes which occurs. Atropine and papaverine tend to prevent the spread of the reflexes.

If a patient survives one embolus she still has a 40 per cent chance of having a second which may prove fatal. In a mild non-fatal case de Takats and Jesser administer a prophylactic dose of papaverine and atropine, three times daily.

Adequate mention should be made of the benefit from the common practice of administering passive as well as active exercises. Massage is of course quite important. Dry heat with the electric baker is also a valuable adjunct in stimulating circulation.

The question of diet is important. Vitamin deficiency may be a larger factor than believed in producing thrombo-phlebitis, and its sequelae. In any case a high vitamin diet has been shown to favour healing of tissues. Anything which favours tissue-healing will favour increased tissue vitality and resistance, less infection and therefore less tendency for thrombosis and embolism.

The factors of surgical trauma and sepsis have not been stressed in this paper because the author considers that active efforts are already being made for their prevention. It should be borne in mind however, that they are still important and relevant considerations.

#### SUMMARY

Pulmonary embolism is sufficiently common and sufficiently serious to warrant our constant diligence for its preventive management. The most specific form of treatment at our disposal is prevention. It is possible to reduce its in-

cidence by instituting a few routine procedures, viz.

1. Prescribe daily post-operative or post-partum graduated exercises (including in particular the active elevation of the legs twenty times daily) to overcome pelvic venous circulatory stasis.

2. Elevate the foot of the bed for 72 hours post-operatively, then three times daily for half an hour.

3. Administer thyroid extract post-operatively.

4. Treat anæmia early and vigorously.

5. Treat heart disease pre-operatively.

6. Maintain a normal blood-sugar level in convalescence.

7. Mobilize the patient early.

8. Treat varicosities pre-operatively.

9. Prescribe a high vitamin diet pre-operatively.

10. Minimize surgical trauma.

11. Administer heparin where practicable.

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## INFLUENZA IN THE REGINA GENERAL HOSPITAL

BY ARTHUR BRYANT, M.D.

### Regina

THIS is a review of one hundred cases of "influenza" in adults admitted to this hospital during November and December of 1940. It was thought profitable to divide the group into two classes, civilians and soldiers, for two reasons. (a) These classes represent different age-groups, the average age of civilians being 34.1 years, with an extreme of 85 years, and the average age of the soldiers being 20 years. (b) Treatment administered to these groups may be contrasted, civilians receiving individual care, with chemotherapy from the beginning in a few cases, whereas the soldiers were given routine therapy, unless complications were evident. Our hundred cases were divided as follows; 43 civilians (14 obstetrical, 29 medical), 57 soldiers. No surgical cases were included in this review.

**Definition.**—Influenza, as we are discussing it, may be defined as an acute respiratory infection of a relatively benign character, associated with moderately severe constitutional disturbances. Recovery is the rule, therefore it is to be clearly distinguished from the pandemic of influenza which swept the world in 1918-1919.

**Etiology.**—There are two principal theories as to the causation of influenza: (a) that it is caused by the Pfeiffer bacillus (*B. influenzae* or

*H. influenzae*); (b) that it is due to a filterable virus. As Boyd says, however, "It seems more probable that influenza is caused by a filterable virus which depresses the resistance of the body to an unparalleled degree, so that secondary invasion by Pfeiffer's bacillus and other organisms (as pneumococcus, streptococcus) may occur". It is these secondary invaders which cause the complications. This is the general consensus regarding the etiology of influenza at the moment.

In our series complications were caused by the pneumococcus in 1 case and *Staph. aureus hæmolyticus* in 3 cases, one resulting in death.

**Symptomatology.**—The onset of the disease was usually sudden, with an incubation period of short duration, as a rule 24 to 48 hours. During the period the patient suffered from slight coryza, malaise, anorexia and perhaps a slight cough. Then the following complaints developed rapidly; severe headache, generalized aches and pains in the joints; fever with occasionally chills; sore throat with hoarseness, a dry, hacking cough; soreness across the chest, malaise, sometimes to an extreme degree. On examination, the patient usually was flushed, of a reddish-pink colour, and in those desperately ill a violet cyanosis was evident at times. In

one case, circumoral pallor was marked. The fauces were red and injected and post-nasal discharge was frequently found. The chest in uncomplicated cases was clear except for occasional rhonchi in a few. The pulse was slow as a rule, 55 to 72 per minute, and a hypotension of 90/60 was frequently encountered in the younger patients.

#### REVIEW OF FORTY-THREE CIVILIAN CASES

*Diagnosis.*—Nineteen of these cases were admitted with "influenza" complicating some other condition. These are enumerated as follows: 2 coronary atherosclerosis with auricular fibrillation, 1 diabetes mellitus, 1 chronic partial bowel obstruction, 1 pleurisy, 14 obstetrical patients.

*Fever.*—The highest temperature on admission was 104.4° F. and the lowest was 97.4°. The average duration of fever was 3.8 days for medical cases and 8.7 days for obstetrical cases.

*Hospitalization.*—The average number of days in hospital, excluding the two cases, one with diabetes mellitus and the other with bowel obstruction, was 8 days for medical cases and 12 days for obstetrical cases.

*Chest.*—Chest signs were absent in all but 6, or 18.1 per cent of the uncomplicated cases. In these 6 cases only rhonchi were heard occasionally.

*Complications.*—Complications occurred in ten, or 23.2 per cent, of the cases. These are enumerated as follows: 1 case of lobar pneumonia with pneumococcic empyema in an obstetrical patient, 6 cases of bronchopneumonia, 1 case of pan-sinusitis, 1 case of severe laryngitis, 1 case of epistaxis with a platelet count of 184,000 which quickly rose to 343,000 as the disease subsided.

*Treatment.*—Most cases were treated symptomatically with steam inhalation, salicylates, cough mixtures, sinapisms. However, 7 patients, or 21.2 per cent, received chemotherapy in the form of sulfapyridine. In both medical and obstetrical cases this was administered for an average of three days. In the former, the temperature was normal in 3.75 days, and in the latter in 10 days. This shows no appreciable improvement over symptomatic treatment. However, this is a very small series of cases, and it is impossible to attribute any true significance to these figures.

As a matter of interest, of the 14 babies born to mothers with "influenza", 2, or 14 per cent,

developed cough and fever of 99.4 and 99.2° subsequently.

#### REVIEW OF FIFTY-SEVEN MILITARY CASES

*Diagnosis.*—Four were admitted with diagnoses other than influenza, later proving to be that disease. These diagnoses were as follows: appendicitis, pneumonia, sinusitis, vaccine reaction. Three other cases were admitted with the following diagnoses: 2 appendicitis, 1 bowel obstruction, and after investigation were considered to be cases of intestinal influenza.

*Fever.*—The highest temperature on admission was 105°, and the lowest was 98.3° F. The average duration of fever was 3.2 days.

*Hospitalization.*—The average duration of hospitalization was 7.6 days.

*Chest.*—There were only 6, or 13.3 per cent, of uncomplicated cases with chest signs, chiefly rhonchi.

*Complications.*—From this group of 57 cases, 12, or 21 per cent, developed complications as follows: 1 acute bilateral hæmorrhagic bronchopneumonia, the patient dying after 13 hours in hospital, 2 unilateral bronchopneumonia with effusion and empyema, 3 bronchopneumonia, 3 sinusitis, 1 otitis media, 1 severe laryngitis and bronchitis, 1 hæmoptysis.

*Treatment.*—The military patients all received routine treatment as follows: salicylates, camphorated oil, chest rubs, cough mixtures, fluids, laxatives, occasional inhalations. No chemotherapy was used in uncomplicated cases.

#### GENERAL REVIEW

We see that age-variation, individual symptomatic treatment, even sulfapyridine therapy, failed to make any appreciable change in the course, prognosis and complications of this disease. The only difference between these two groups was in the chest signs, which occurred slightly more frequently in older patients.

*Complications.*—In these 100 cases, complications resulted in 22 per cent and one death occurred. Listed in order of frequency, the complications were as follows: 54.5 per cent bronchopneumonia, (1 expired), 2 developed effusion and later empyema; 18.2 per cent, sinusitis; 9.1 per cent severe laryngitis and bronchitis; 4.55 per cent each of lobar pneumonia with empyema, otitis media, hæmoptysis, epistaxis. I propose to discuss in more detail the four most seriously ill patients of this group, one of whom expired.



TABLE I.  
SUMMARY OF CIVILIAN AND MILITARY CASES

Average age in years	Admission temperatures		Duration of fever in days		Length of stay in hospital in days	Chest signs	Complications	
	Highest	Lowest	Without dagenan	With dagenan		Rhonchi		
Civilians 34.1	104°	97°	Medical . . .	3.8	3.75	8.0	percentage 18.1	percentage 23.2
Extreme of 85			Obstetrical..	8.7	10.0			
Soldiers 20	105°	98°		3.2		7.6	13.3	21.0

## CASE 1

A soldier, 21 years of age, ill 3 days with influenza, was admitted with the diagnosis of pneumonia and the final diagnosis at autopsy was acute bilateral hæmorrhagic bronchopneumonia, due to *Staph. aureus hæmolyticus*. His temperature on admission was 104°, maximum 105° and fever lasted until his death 13 hours later. Chest signs; diminished excursion and resonance, bronchial breathing at bases, and coarse râles throughout. The leucocyte count was 3,450. X-ray revealed widespread bronchopneumonia.

Treatment: supportive measures, dagenan by mouth, dagenan intravenously in large doses.

## CASE 2

A soldier, 21 years of age, ill 3 days with influenza, was admitted with a diagnosis of pleurisy; the final diagnosis was right bronchopneumonia with pleural effusion and empyema, due to *Staph. aureus hæmolyticus*. His temperature on admission was 99.4°, maximum 104°, and the duration of fever 37 days. The excursion of the right chest was slight; flatness on percussion posteriorly below the inferior angle of the scapula; a friction rub in the right axilla.

Treatment: aspiration of chest, symptomatic therapy, dagenan by mouth 19 days, sulfathiazole by mouth 4 days. Then agranulocytosis occurred suddenly, his leucocyte count dropping from 10,500 to 1,600 in 5 days; hæmoglobin 60 per cent, and red cells 2,800,000. Transfusions of 500 c.c. raised the white count to 5,000, hæmoglobin to 74 per cent, red cells to 3,900,000, and 4 ampoules of intramuscular pentnucleotides over three days increased the count to 20,800, hæmoglobin 84 per cent, red cells 4,300,000. He was discharged improved after 52 days in hospital.

## CASE 3

A soldier, aged 22 years, ill 3 or 4 days with influenza, was admitted with a diagnosis of influenza and possible pneumonia; the final diagnosis was left bronchopneumonia with empyema. His temperature on admission was 103°, maximum 103.2°. The duration of fever was 67 days; the man was still in hospital after 69 days. Chest; signs of consolidation.

Treatment: symptomatic; dagenan ten days, (a dagenan rash developed so it was discontinued); aspiration of chest revealed pus; and *Staph. aureus hæmolyticus* cultured. The following day measles developed. He was isolated for 14 days and a rib resection was done. He is at time of writing still in hospital, progressing well.

## CASE 4

An obstetrical patient, aged 26 years, was ill several days with influenza; the final diagnosis was left lobar pneumonia with effusion and empyema. Her temperature on admission was 98.4°, maximum 104° on the 30th day. Duration 59 days. Chest signs; fluid on the left side.

Treatment: symptomatic, dagenan eight days, aspiration twice, with considerable fluid removed. Pus was aspirated 28 days after admission and pneumococcus cultured; rib-resection six days later. Outcome; still in hospital at time of writing, progressing well.

## CONCLUSIONS

1. One hundred cases of influenza have been reviewed.
2. Mortality rate, 1 per cent.
3. Complications occurred in 22 per cent of cases.
4. Age-variation, and individual symptomatic therapy failed to influence the course, prognosis, and incidence of complications.
5. Regarding the value of chemotherapy in uncomplicated cases no definite conclusion can be reached, since our series is small and no proper control cases were observed. It did not, however, appear to influence the course or prognosis. Its use in *extremis* was attended by no improvement. When complications were present, its use apparently encouraged localization of infection, but did not aid resolution.



## GONORRHOEA IN THE FEMALE\*

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TODAY venereal disease constitutes a major public health problem. Recent widespread publicity has aroused an interest and concern on the part of the laity and the medical profession. New developments in diagnostic procedures, including a blood chocolate culture medium for the detection of the gonococcus, have removed one of the stumbling blocks in determining the presence of gonococcal infection. Research in the field of chemotherapy has introduced sulfanilamide and sulfapyridine, which have necessitated changes in the older form of treatment. In view of this it seemed advisable to present the results of our experience with gonorrhoea in the female at the Division of Venereal Disease Control of the Provincial Board of Health, British Columbia.

This report is based on a study of 1,712 women, both married and single, who were seen in the first two and one-half years of the sulfanilamide therapy period. Of this group 626 were proved to have gonorrhoeal infections. The majority of these women were either on relief or of low economic status and were admitted and treated as in an out-patient clinic. Their ages varied from 16 to 69 years, the average age being 22.9 years. This group was comprised of those who sought admission because of symptoms of vaginal discharge, those who were brought in for investigation by the Epidemiological and Welfare Department as alleged sources or contacts, and those who were referred by the law-enforcement authorities for examination.

## DIAGNOSTIC PROCEDURES

Gonorrhoea attacks the urethra (Skene's glands), Bartholin's glands, and the cervix of the uterus. In the acute phase there is often some degree of vaginitis with swelling and oedema of the vulva which lasts for approximately ten days. It is, therefore, important that the diagnostic procedures be not applied to the

vagina only but, rather, to all the sites that have a predisposition for the gonococcus.

The clinical examination of the patient consisted of a complete history and physical examination. The following procedure was adopted for the pelvic-vaginal examination. The patient was placed in the lithotomy position, and, under good light, examined first superficially. The introitus was then swabbed off with a little weak potassium permanganate solution. Next, spreading the labia apart with the fingers of the left hand, the index finger of the right hand was inserted into the vagina and the urethra milked against the pubic symphysis. The Bartholin glands were investigated and an attempt made to expel pus from the duct, using the thumb and index finger. The cervix was examined by means of a bivalve speculum, no lubricant being used. The plug of mucus was thoroughly removed from the cervical canal and smears taken on a cotton applicator. These local examinations were performed as they were considered necessary in order to establish a diagnosis. If a profuse, frothy, milky discharge was evident, which had been present for some time, and the vaginal mucosa was red and sore then some infection other than gonorrhoea was suspected, although gonorrhoea may also have been present. *Trichomonas vaginalis* infection was present in 20 per cent of the cases diagnosed as gonorrhoea.

Routine laboratory tests to prove the existence of gonorrhoeal infection in the female were carried out in the following manner. On the patient's first visit smears were taken from the stripped urethra, from the cervix, and, if obtainable, from pus expelled from the Bartholin's glands. This material was stained by Gram's stain and examined immediately for gonococci. If none were found the urethra was painted with 2 per cent silver nitrate and the cervix with 5 per cent silver nitrate. On the second day smears were taken again, and the paintings with silver nitrate repeated. On the third day smears and cultures were taken. Our experience has

\* Presented at a meeting of the Osler Society, Vancouver, B.C., on October 30, 1940.

been that smears to prove the presence of chronic gonorrhœa in the female were practically useless, whereas cultures, in addition to clinical evidence, were very efficient. We noticed in the literature that the use of silver nitrate had a tendency to make the infection more resistant to treatment, but our experience did not confirm this. Further, we are sure that a number of chronic cases would not have been discovered had we discontinued the use of this practice.

The culture medium, a blood chocolate agar, was brought to the clinic in Petri dishes packed in a thermostatic box. Material from the sites of infection was transplanted directly from the patient to the culture medium according to the method described by Malcolm and Dolman.<sup>1</sup> The culture medium was then replaced immediately in the thermostatic box.

Gonorrhœa in the female rectum is a common complication and usually is caused by contamination from the vagina. Routine rectal examinations were not done. The only cases from whom rectal smears and cultures were taken were in those who complained of some symptom suggesting rectal infection. There were 8 of these cases in the group under consideration.

#### METHOD OF TREATMENT

For therapeutic reasons an attempt was made to classify the cases of gonorrhœa in the female into the following types: (a) acute, (b) subacute and (c) chronic. Since the time-factor as to onset was often misleading, our classification of the type of infection was made in the following way.

(a) Cases which gave a history of recent exposure and where local examination revealed an acutely inflamed urethra and cervix and in which the smears were positive, were classified as acute infections. There were 272 cases diagnosed as acute. It was found that the infection remained in the acute stage from two to four weeks after it was acquired.

(b) Cases which did not give a history of recent exposure, in which local examination revealed a lesser degree of inflammation, and in which the smears may or may not have been positive, were classified as subacute infections. There were 73 cases diagnosed as subacute. It was found that the infection became subacute from four to six weeks after it was acquired.

(c) Cases which gave an indefinite history of exposure, and in which local examination re-

vealed very little inflammation in the cervix and urethra, and in which the smears were always negative but the cultures were positive, were classified as chronic infections. There were 281 cases diagnosed as chronic. It was found that infections became chronic from three to four months after they were acquired.

Regardless of the stage of infection found to be present, the patient was given a course of sulfanilamide, consisting of the oral administration of 140 tablets, five grains each, with an equal amount of soda bicarbonate. The patient was instructed to take 3 tablets four times daily for four days; 2 tablets four times daily for four days; and 1 tablet four times daily for approximately three weeks.

In the acute cases no local or pelvic examination was done on the patient unless it was absolutely necessary. Local treatment, neither medical nor surgical, was given, as it was thought that such procedure was not only inadvisable but contraindicated because it tended to produce pelvic complications. Recently, the course of sulfanilamide outlined above has been repeated after two weeks' rest, if the drug had been well tolerated, as it was sometimes felt that the drug was more beneficial after the acute stage had passed.

In the subacute stage local treatment, in addition to the sulfanilamide therapy, was instituted. This local treatment consisted of the following. Twice a week the urethra was washed out with 2 per cent mercurochrome. The cervix was treated with 5 per cent mercurochrome on a cotton applicator, and a tampon of 1:1,000 acriflavine in normal saline was introduced into the vagina and left in for twelve hours. Chronic cases were treated surgically. A course of sulfanilamide was also given if pelvic complications occurred in the late stage of the infection.

The following instructions regarding personal hygiene and conduct were given to the patient, as these were considered of importance in the prevention of pelvic complications: (1) to rest in bed during the menstrual period, especially the first one following infection. Sedatives were given if there was a history of severe uterine cramps; (2) to take hot sitz baths twice daily; (3) not to take any douches; (4) to abstain from sexual contact or excitement and alcohol; (5) not to take enemas for fear of infecting the rectum; (6) to maintain a full, well balanced diet.



The acute complications encountered were pelvic inflammation and salpingitis; Skene's abscess; Bartholin's abscess; abscess of the anterior minor vestibular gland; and acute arthritis.

For acute pelvic inflammation and salpingitis hospitalization was prescribed, and the following treatment carried out: (1) general medical care and sulfanilamide therapy as described previously; (2) rest in bed in a modified Fowler position; (3) heat or cold applied to the lower abdomen; (4) regular bowel elimination, preferably with mineral oil. If it was necessary to give an enema the perineum was cleansed before the rectal tube was inserted; (5) a liquid or soft diet was advised; (6) codeine, one-half to one grain doses, combined with acetylsalicylic acid, grains five to ten, was prescribed for pain. Trauma was avoided, and pelvic examinations were infrequent and performed with extreme gentleness.<sup>2</sup> A sedimentation test was done on the patient before she was discharged from hospital. If the sedimentation rate was found to be slow, her discharge from hospital was approved, but if it was found to be still rapid the patient was kept in bed until the rate approached the normal. This procedure was instituted in order to prevent recurrence of the infection when the patient became ambulatory. There were 9.2 per cent of the cases studied which had some pelvic complications; of these, 7.6 per cent had pelvic inflammation on admission, and 1.6 per cent developed pelvic inflammation while under treatment.

In acute arthritis general care as described above and sulfanilamide therapy were instituted, and all foci of gonorrhœal infection were treated. Fever therapy was used in some cases with satisfactory results. There were 7 cases of gonorrhœal arthritis treated, of which 6 were present on admission and 1 developed while under treatment. Other foci of infection, such as diseased teeth, etc., also received investigation.

Since the introduction of sulfanilamide therapy indications for operations in pelvic complications were extremely rare, and were considered only after prolonged conservative treatment failed to relieve symptoms. Local surgical procedures, however, were common and were performed in the following manner.

1. Acute Skene's abscess was opened under local anæsthesia, produced by the use of 1 per cent novocaine injected with a hypodermic

syringe, care being taken by first aspirating before injecting the novocaine to ensure that a vein had not been entered. The abscess was packed and kept packed until healed.

2. Acute Bartholin's abscess was opened under local anæsthesia and kept packed until healed. There were 23 cases of Bartholin's abscess, of which 17 were present on admission and 6 developed while under treatment.

3. Chronic Skenitis, after the use of local anæsthesia as described above, was treated by excision, if of the external type.<sup>3</sup> Usually, however, it required a lachrymal probe to be placed in the gland and then the probe touched with an electric cautery point.

4. Chronic cervicitis and Nabothian cysts were treated by linear or electric cautery. Care was taken not to cauterize as far as the internal os. This was done following the menstrual period but not when there was any evidence of acute or sub-acute inflammation in the cervix or the pelvis above. Hyams' conization was used also, but not on young women. In the presence of a retro-flexed uterus, if any cauterization was performed at all it was not deep. The only time the cautery was used deeply to involve muscle was when there was some deformity that could be corrected by the contracting scar. This type of treatment was not administered to children or pregnant women.

5. In chronic Bartholinitis the gland was destroyed by electro-coagulation under local anæsthesia, although excision would probably have been a better method of procedure.

The treatment of gonorrhœa during pregnancy consisted of a course of sulfanilamide as described previously. This course was repeated if necessary. Strict attention was paid to the patient's blood picture, to anticipate a secondary anæmia. No local treatment was given to the cervix of the uterus because it was thought that the increased acidity of the normal pregnant vagina would be upset by the local medication. The urethra was treated locally. Twenty cases of gonorrhœa complicating pregnancy were treated.

The most important factor in the treatment of gonorrhœa in the female is to prevent pelvic and other complications. Although some authorities advocate the withholding of sulfanilamide therapy for the first ten days of the infection, to allow the patient to develop a natural immunity,<sup>4</sup> we instituted sulfanilamide therapy in the acute stage as soon as a diagnosis had been

established. To prevent salpingitis, rest in bed with the menstrual period, and a sedative if uterine cramps were severe are important. The avoidance of douching, alcohol, trauma, either sexual or by rough and frequent examination, is also important in the prevention of complications. Acute complications in a majority of cases developed in relation to the first menstrual period.

Those women who had a retroflexed uterus did not do as well under treatment and were more prone to pelvic complications.

In this series we had 53 cases of pelvic inflammation, and of these 42 were present on admission and 11 developed while under treatment. Occupation and economic status played an important part in this matter. Those women who were obliged to work during the acute stage of their infection and through their menstrual period, especially at work which kept them on their feet, showed a higher incidence of pelvic complications. Blondes did not seem to have the same degree of natural resistance as did brunettes.

Seven selected cases were treated by fever therapy and all these had many complications. As there were not many of these cases it was not possible to form any definite opinion regarding the value of this form of therapy. Generally, the results were good. Because of the expense involved in this type of treatment it had to be discontinued.

#### TEST OF CURE

In this series we did not try to shorten the duration of treatment, but we did try to be particular not to discharge any women as apparently cured until everything possible had been done to prove them positive. No attempt was made to establish proof of cure until after the patient had been under treatment for at least three months. The average duration of treatment of the acute cases was 18.3 weeks and that of chronic cases 20 weeks. When the patient had been under treatment for the required length of time and had been pronounced clinically clean, and all pre-existing foci of infection had been treated surgically, smears and cultures were taken. Then, if the smears and cultures were negative the patient was absented from the clinic for a period of one month, to carry on a normal life without treatment. The only restriction placed on the patient during this period was abstinence from

sexual contact and alcohol. At the end of the rest period of one month the patient returned for further tests. If the smears and cultures were still negative the patient was then discharged as apparently cured of her infection. Of the group 64 per cent were discharged as apparently cured without any local surgery having been performed.

#### SUMMARY

1. This is a report of 1,712 women who presented themselves for examination at the Vancouver Clinic, Division of Venereal Disease Control, Provincial Board of Health, British Columbia. Of these, 626 were proved to have gonorrhœa.

2. A routine physical examination was done on all cases. Routine tests consisted of a three-day examination. On the first day smears were taken and examined by Gram's stain. If no evidence of gonorrhœa was found, the urethra was painted with 2 per cent silver nitrate and the cervix with 5 per cent silver nitrate. On the second day smears were taken again and the silver nitrate repeated. On the third day smears and cultures were taken.

3. *Trichomonas vaginalis* infection was present in 20 per cent of the cases.

4. Gonorrhœal infection of the rectum was present in 8 cases, but only those patients complaining of rectal symptoms were examined.

5. Cases were classified as acute, subacute and chronic. In the acute stage local and surgical treatment are contraindicated; in the subacute stage surgical treatment is contraindicated; and in the chronic stage surgical treatment can be undertaken safely.

6. All cases received sulfanilamide therapy. One course at least was given, and if the drug was well tolerated two courses were given. There were 64 per cent of cures on sulfanilamide therapy alone.

7. Pelvic complications were present in 9.2 per cent of the cases.

8. Factors preventing complications were considered to be sulfanilamide because of its curative virtue and also because it discourages local treatment during the acute stage when local interference is contraindicated. Trauma, sexual contact, many pelvic examinations during the acute stage, etc., are contraindicated. Rest in bed with the menstrual period, especially the first, is important in the prevention of pelvic complications.

9. The criteria of cure were as follows. When the smears and cultures both became negative the patient was placed on a rest period of one month, the only restriction being abstinence from alcohol and sexual contact. Before these tests were taken the patient had been under treatment for at least three months and had been found to be clinically clean. At the end of one month's absence from treatment the patient returned to the clinic for additional laboratory tests. If smears and cultures were still negative the patient was then discharged as apparently cured.

The average duration of treatment in cases of acute gonorrhœa was 18.3 weeks; the average duration of treatment in chronic cases was 20 weeks.

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## INTRA-ABDOMINAL HÆMORRHAGE

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AND .

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THE authors, having recently encountered a short series of surgical emergencies, resulting from intra-abdominal hæmorrhage from unusual causes, were moved to investigate the whole subject. Both the records of the Montreal General Hospital, and the literature were explored. During the past five years more than 40 cases of severe hæmorrhage were operated upon in both divisions of this hospital, while a smaller number received expectant treatment, or were too rapidly fatal for surgical intervention.

The commonest cause was found to be ruptured ectopic pregnancy, of which there were sixteen cases; in six, the liver had been the site of the hæmorrhage, and in four, the spleen and splenic vessels. Sundry other hæmorrhages occurred from ruptured aneurysm, ovarian cysts, secondary intra-abdominal bleeding, etc. In one very interesting case the hæmorrhage resulted from a longitudinal tear in the mesentery of the ileum following an injury. We have not been able to find such a case reported in the literature. In addition to the above, several cases of splenic hæmatoma were treated expectantly.

The search of the literature revealed a large number of reported cases of widely different causation, but little information on the subject

as a whole. We have thought it worth while to endeavour to assemble the accumulated knowledge briefly and to add our own personal observations. The present war makes the matter all the more timely. We also feel that recent developments in blood and serum transfusions and the results of recent investigations on surgical shock have given us a further excuse, if one be needed, for this review.

## ETIOLOGY

The causes of intra-abdominal hæmorrhage are so numerous that we have decided to offer them in the form of a classification. This is based upon cases previously reported in the literature, or encountered in our hospital. In suggesting this classification we would remind the reader that such hæmorrhage may be either immediate or delayed, and, again, that it may be either localized or diffuse and massive.

1. *Traumatic*.—(A) Perforating wounds of abdomen, *e.g.*, stab, gunshot, and other perforations. (B) External violence, resulting in rupture of abdominal organs; rupture of adhesions with their blood vessels; rupture of hæmatoma in abdominal wall or retroperitoneal space; laceration of peritoneum and vessels; birth trauma; criminal abortion.

2. *Spontaneous hæmorrhage* from local disease.



(A) *Pelvic organs.*—Ruptured ectopic pregnancy; ruptured ovarian cysts and follicles; radium erosions in carcinoma of uterus; rupture of degenerated fibroid tumour of uterus; rupture of veins in pregnant uterus or broad ligaments; torsion of tube and ovary; endometrium of ovary; rupture of parovarian cyst; chorionepithelioma.

(B) *Spleen and vessels.*—Infarction, rupture of splenic vein in thrombosis, cirrhosis of liver, Banti's disease, leukæmias; torsion of pedicle; rupture in septicæmia, and typhoid fever; malarial spleen.

(C) *Liver and vessels* (including biliary system).—Necrosis of liver, gall-bladder or vessels from contiguous disease or biliary calculi; toxic hepatitis with necrosis; cirrhosis with portal obstruction and rupture of vessels; rupture of liver abscesses; rupture of liver cysts (congenital and parasitic); tumours of liver, such as angioma, carcinoma; ascaris lumbricoides in biliary system.

(D) *Pancreas.*—Necrotic pancreatitis, with hæmorrhage; rupture of necrotic neoplasm; rupture of pancreatic cyst.

(E) *Adrenals.*—Massive hæmorrhage with rupture; rupture of neoplasms.

(F) *Stomach and intestines.*—Perforation of typhoid ulcers; phlegmonous ulceration; parasitic erosions; neoplastic growths; perforation of inflamed appendix with erosion; obstructive bowel lesions (tumour, volvulus, etc.).

(G) *Vascular disease per se.*—Aneurysms, including mycotic, abdominal apoplexy from arteriosclerotic erosion; varicose veins over tumours, cysts, etc.; suppurative thrombosis of veins with erosion; thrombosis of mesenteric arteries or veins; periarteritis nodosa.

(H) *Miscellaneous.*—Rupture of retroperitoneal tumours; rupture of vessels in abdominal wall; neoplasms of pelvic and vertebral bone.

3. *Post-operative.*—Immediate (slipped ligature); delayed or reactionary; secondary to necrosis or infection of vascular ligature (cholecystectomy).

4. *Symptomatic of constitutional disease.*—Purpura; hæmophilia; undulant fever; acute rheumatic fever (with mycotic aneurysms); acute bacterial endocarditis, (with mycotic aneurysms); chronic hæmorrhagic peritonitis; scurvy.

5. *Congenital.*—Rupture of aneurysms of abdominal arteries; hæmorrhagic disease of the newborn; icterus gravis; erythroblastosis.

#### PATHOLOGY

The etiological pathology of non-traumatic intraperitoneal hæmorrhage requires no elaboration here. We are concerned, however, with the local and systemic pathological processes resulting from the hæmorrhage itself. The local effects will be considered first.

Blood has the ability to produce a more or less violent reaction in all closed serous surfaces, and the peritoneum is no exception. Although the exact mechanism of this reaction is not known, the effects are of the nature of acute inflammation, such as might result from bacterial infection. There is an outpouring of serous or sero-fibrinous exudate, containing leucocytes, diluting the blood and increasing the volume of fluid at first. Clotting of the blood is imperfect and partial to a variable degree. In splenic bleeding there is generally a greater tendency to clot; if not drained off absorption of the mixture commences and proceeds at a varying rate; hæmolysis also occurs, with breaking up of the red blood cells; dissolution of the blood clot ensues eventually, and the colour of the fluid mixture becomes brownish and even darker, as in any hæmatoma. The above hæmorrhage and subsequent processes may remain localized or involve the general peritoneal cavity. Ultimately the hæmoperitoneum, unless removed by operation or secondarily infected, undergoes the fate of all similar collections, being largely absorbed, and the remainder organized. Adhesions which are such frequent sequelæ to blood in the peritoneal cavity represent the organized residue. If infection occurs, peritonitis results, with all its attendant consequences.

What of the general effect on the patient? Absorption of the hæmoperitoneum, diluted by effusion, produces a definite systemic reaction. The immediate effect is one of shock from altered blood proteins, and is aggravated by the actual blood loss. This effect is also exaggerated, as is well known, by the presence of bile, pancreatic secretion, etc., in the intraperitoneal mixture. If hæmorrhage continues, the shock will become more and more profound (see diagnosis). If and when the hæmorrhage slows up or ceases a distinct febrile phase begins and may become very marked. The reaction is retarded by continued hæmorrhage. The fever results from the continued absorption of altered blood products, and will continue until the hæmoperitoneum is disposed of.

The whole picture of shock, hæmorrhage and toxæmia, varies directly in degree with the amount of hæmorrhage, and the area of the peritoneum involved. It also varies in degree and timing, depending on certain other factors, namely: (1) The location of the hæmorrhage, *i.e.*, the pelvis, may not, as a rule, react as sharply as the upper abdomen. (2) Existence or absence of other peritoneal irritants from damage to various parenchymatous organs, as, bile or pancreatic secretion. (3) Localization by fibrinous adhesions, omentum, pre-existing adhesions, etc. (4) Presence or absence of bacteria causing infection, as in perforation of bowel or pelvic inflammatory disease.

#### SYMPTOMATOLOGY

The great variety of causes of hæmorrhage into the peritoneal cavity will naturally result in a complexity of symptoms. An extremely careful history thus becomes necessary. Important symptoms may be overlooked by a patient while emphasizing some minor injury. An example of this is found in case 1. Again injuries to extremities, etc., suffered in an accident, may distract attention from an occult intra-abdominal hæmorrhage, which causes no pain, as in case 2. In other cases, extensive multiple injuries may result in unconsciousness, masking an existing hæmorrhage as in case 3. All these happenings emphasize the absolute necessity of a complete physical examination in all severe injuries. Although the symptoms presented may be various, there are certain ones common to all cases, resulting as they do from the hæmorrhage itself, namely:

1. *Pain*.—This is due to peritoneal reaction from the blood and is typically sudden, sharp and steady. However, it should be remembered that pain may be minimal or absent entirely; an example of lack of pain occurred in case 2. The pain may radiate, as does other intra-abdominal pain, to a shoulder, etc. The location and radiation of the typical pain is of great importance in localizing the site of the bleeding; for example, a splenic rupture will regularly cause left upper quadrant pain, which radiates to the left shoulder tip. Again, the pain of a ruptured ectopic gestation is usually lower abdominal at first, but if blood flows along the abdominal gutters the upper abdomen pain may radiate to the shoulders. Breathing, coughing, sneezing may exaggerate the pain; although the typical pain is steady,

colicky pain may supervene. It should be remembered that, early, the pain of actual injury may obscure that inside the abdomen. It may also be stated that the amount of intra-abdominal pain is not proportional to the volume of bleeding.

2. *Shock*.—Shock is also typically sudden; it frequently commences concurrently with the onset of pain, but may be delayed. Sometimes, however, shock may be the only significant symptom, as in case 2. It may be so profound as to lead to early coma, but at other times premonitory symptoms such as dizziness, yawning, visual disturbances, sweating, nausea, etc., may precede oncoming collapse. As shock develops it is marked by restlessness, irritability, thirst, weakness, shallow sighing respiration, rapid thready pulse, subnormal temperature, falling blood pressure, grayish cyanosis and cold clammy skin, especially of the extremities. Drowsiness then comes on and gradually deepens into coma.

3. *Splinting* of the abdominal wall is usual and marked, but may be delayed, slight, or even absent, as in case 2. This sign is not proportional to the amount of hæmorrhage.

4. *Tenderness* is usually marked, but may be remarkable by its absence. It is usually local at first, becoming generalized as the hæmorrhage spreads.

5. *Dullness to percussion* is most frequently present in the flanks and shifts on turning the patient. It may be localized in splenic bleeding when the tendency to clot is most marked.

6. *Rectal tenderness* is naturally most marked and earliest in pelvic bleeding, and in these cases a blood clot mass may be felt.

7. *Abdominal respiration* is usually decreased from the outset.

8. *Nausea and vomiting* may occur early or late and frequently are associated with abdominal colicky pain.

9. *Fever* will occur as the patient recovers from shock.

All these common symptoms are modified by the rate and volume of hæmorrhage, the irritability of the peritoneum, and certain contributing factors, such as exposure, fatigue, etc. In addition to the common symptoms certain specific ones may occur in special cases. A discussion of these in any detail is beyond the scope and purpose of this paper.



## DIAGNOSIS

In discussing this aspect we wish to remind the reader that we are concerned with those cases in which surgery will be useful. Some of these present only ordinary problems of diagnosis, but in others the pre-operative diagnosis may be most difficult or even impossible. What are these difficulties?

(1) The history may be insignificant, as in case 5. (2) There may be a straightforward history but very few signs (case 2). (3) The patient may be unconscious (case 3). (4) The hæmorrhage may be delayed as from a subcapsular splenic hæmatoma (case 9). (5) Symptoms and signs may simulate another lesion (case 4).

In overcoming these difficulties we have recourse to certain special types of laboratory investigation, as well as to careful clinical observation. From time immemorial the blood pressure and the pulse readings have been taken at regular frequent intervals and charted. By this method the onset and progress of shock has been checked and judgment of these readings helped much in determining the diagnosis, as well as in gauging the time of operation. Thanks to the work of Moon, Scudder and others we now have a much improved method. These investigators have considerably facilitated the diagnosis and also the treatment, by showing that hæmoconcentration is a much more accurate criterion for determining the onset of shock. It also helps to differentiate shock resulting from trauma alone from shock secondary to or complicated by hæmorrhage. This hæmoconcentration may be detected by hæmatocrit readings, the specific gravity of the blood, estimation of the hæmoglobin, or the red blood cell count. Any or all of these methods may be employed. The findings in hæmoperitoneum are similar to those with external hæmorrhage and shock.

White blood counts are often very high. Counts of 15,000 to 20,000 are not uncommon, simulating peritonitis. Urinalysis is also important, the presence of hæmaturia helping to differentiate kidney injuries from intra-abdominal bleeding. X-ray examination of the abdomen is of particular value in excluding perforations of a gastric or duodenal ulcer, when a collection of gas will frequently be found under the right diaphragm.

Finally, abdominal paracentesis is advocated by some surgeons in all cases when other methods

fail to make the diagnosis clear. There is much to be said for, and little against this procedure. We feel that those who advocate this measure would not do so if any serious risk were involved, but we have had no experience with it ourselves.

## TREATMENT

Generally speaking, this will be expectant or operative, expectant in all those cases in which the bleeding has ceased before serious consequences occur. In doubtful cases expectant treatment may be carried out as a temporary measure, until the status of the patient is clear. However, the great majority of all intra-abdominal hæmorrhages will require exploration surgically. These cases may be subdivided into a number of surgical groups.

(A) Those surgical emergencies which require immediate operation. In all these cases, the diagnosis of severe continuing hæmorrhage is sufficient to warrant interference, even though the source of bleeding is obscure. The condition of the patient brooks no delay. (For example cases 3 and 6).

(B) Those cases with slower but continuing hæmorrhage and slower oncoming shock will inevitably require operation. (For example, case 2).

(C) Cases in which bleeding is minimal and tends to cease spontaneously. In these a period of observation is necessary. Operation may or may not become inevitable. (For example, cases 5 and 11).

(D) Subcapsular hæmorrhage in which operation may be avoided, though some cases eventually require exploration. (For example case 8).

(E) Rapidly fatal cases, making operation impossible or inadvisable.

*Group A. Surgical emergencies.*—The guiding principle in these cases is that shock is not a contraindication to early operation. However, every known means to combat or prevent shock should be commenced while preparing for operation and continued during and after the abdomen has been opened. The most useful measure is the intravenous administration of blood, blood serum, and 5 per cent glucose saline in about that order. If blood from a "bank" is available, this should be given at once, but if the delay incident to grouping etc. occurs, intravenous administration of any of the other fluids should be commenced at once. A good volume of fluid may thus be given early, after which



the continuous drip method may be maintained. Into the continuous drip apparatus may then be placed whatever further blood or fluids are deemed advisable. The large baker is the best method of administering heat, and the foot of the bed should be elevated.

*Operation.*—An adequate exploratory incision is the first consideration. On opening the abdomen the source of the bleeding should be searched for and attended to at once. If a sizable vessel is at fault clamps will permit time for consideration of further procedure. If the liver is ruptured or lacerated packing may serve the same purpose. After packing, the surgeon may find it impossible to suture this organ and the packing may be all that can be done. Damage to the spleen is usually so severe as to require immediate splenectomy. Only minor lacerations are amenable to suture. In ruptured ectopics the tube and ovary should be clamped off and removed. Other hæmorrhages are dealt with according to their nature. One detail of the operation requires a special note. Either early or later during the operation the free, fresh blood in the abdomen should be suctioned off or ladled out into a sterile vessel containing sodium citrate solution. It should then be filtered with gauze and is ready for replacement in the patient's blood stream, depending upon necessity. This may be carried out immediately or the blood held for later use. The operation being completed, the abdomen is then closed, usually without drainage. The patient is then returned to bed and further treatment for shock is carried out as indicated.

*Group B.*—Cases with slower bleeding and less shock than group A will require the most careful observation, with frequent hæmatocrit, blood pressure and pulse readings, while shock treatment is being carried out. These patients are given frequent small transfusions in order to combat the shock present. It is of practical importance to remember that a patient who has received sufficient blood should be showing signs of improvement. If the condition of the patient remains stationary, it indicates further hæmorrhage, and demands immediate operation. (Example case 5).

When operation becomes inevitable in these cases, the procedure will be the same as in group A with all the same precautions.

*Group C.*—Hæmorrhage which ceases spontaneously under observation and anti-shock treatment usually will not require operation.

However, several days may elapse before this decision is reached; during this time all the observation precautions, tests, and treatment will be carried out as in group B.

*Group D.*—Subcapsular hæmorrhage of the spleen and similar cases require special mention. Absolute quiet in the supine position is necessary, sufficient sedation to assure this is given and repeated laboratory observations carried out. Transfusion and intravenous solutions must be given only when necessary, and slowly, with great care, to avoid the raising of blood pressure dangerously. The fear in these cases is that the hæmatoma may rupture, precipitating an emergency one is endeavouring to avoid, and the patient will not be safe from this threat for many days and even weeks. At least three weeks' rest in bed will thus be necessary and a further period of convalescence.

*Group E.*—The only comment that is called for in these cases is that they are all inoperable, either because of rapid death, or because the patient is moribund on admission.

We present now, in brief, certain of our hospital's more interesting cases, occurring during the past five years. They are used to illustrate certain clinical features we have emphasized.

#### CASE 1

(M.G.H., No. 6338-39). A female aged 17 years was struck in the left leg a glancing blow by a car bumper. She was taken immediately to a suburban hospital, where examination revealed only superficial abrasions of the leg and she was allowed to go home. She slept that night, but in the morning was found almost comatose; on enquiry she complained of pain in the left upper quadrant, aggravated by breathing, and referred to the left shoulder. On further questioning she admitted having had some of the above pain shortly after the accident.

On admission shock was marked. There was moderate splinting and tenderness throughout the abdomen, but most marked in the left upper quadrant. There was also tenderness in the left flank, and shifting dullness in both flanks; the urine was negative.

At operation the abdomen was filled with fluid blood, of which 1,500 c.c. were recovered, citrated and filtered: 500 c.c. was immediately replaced in the circulation and the balance saved for later administration. The spleen was found to be torn across transversely including the hilum. Splenectomy was carried out and the abdomen closed without drainage. The remaining 1,000 c.c. of recovered blood were given in two equal lots during the next 24 hours. Recovery was uneventful.

#### CASE 2

(M.G.H., No. 2638-36). A male aged 32 years was struck and knocked down by a car. He was not run over, but further details were lacking; 15 minutes later the patient walked into the hospital complaining of head bruises and a laceration of the scalp. There were no abdominal complaints. On examination he was found to be in mild shock with a pulse of 80 and a blood pressure of 104/80. The abdomen was soft and negative to all examination. X-ray of the skull was negative. He was kept in bed and treated for shock with the baker,

etc. Half an hour later there was no change in his complaints, but his shock was marked as evidenced by a pulse of 92 and a blood pressure of 96/56 as well as his general appearance. Red blood cells were 4,200,000, hgb. 65 per cent and white blood cells 8,600. The abdomen showed no change. One and one-half hours after admission the shock had increased. The pulse was 100 and thready, and the blood pressure 90/48. The urine was negative. Examination still showed nothing to account for the change. Two hours after admission the patient's shock had become more marked with drowsiness, clammy extremities, sighing respiration and rapid (120) thready pulse. The blood pressure was 65/45. At this time, shifting dullness in the flanks was suspected, though there was no splinting or tenderness. Arrangements were made for a transfusion and operation advised.

On opening the abdomen, a moderate amount (300 c.c.) of blood and clot was encountered. The cause of this was slow bleeding from a small vein in an inch and half long tear in the mesentery of the ileum near its root. It is interesting to note that this rent was in the longitudinal direction, and not transverse.

After ligation, repair of the rent, and toilet of the abdomen, closure was done without drainage. Subsequent recovery was uneventful.

## CASE 3

(M.G.H., No. 1221-35). A male child aged six years was struck by a "hit and run" driver, and rendered unconscious. No particulars were available. He was brought to hospital almost immediately and shortly recovered consciousness, when he complained of abdominal pain.

Examination showed marked shock with a pulse of 120 and shallow, sighing respiration. There was incontinence of urine and feces. The abdomen showed marked general rigidity and tenderness, with shifting dullness in the flanks.

Operation within two hours of the accident showed a large laceration of the liver dome, and the abdomen filled with blood. The laceration was packed with gauze, the blood cleaned out and the abdomen closed. In spite of multiple transfusions, the hæmorrhage continued and death ensued 15 hours after operation. Autopsy showed the laceration to have continued to bleed in spite of packing.

## CASE 4

(M.G.H., No. 3446-39). A male aged nine years was forced against a hydrant by other boys while playing. He did not complain at once but shortly went home, where he fainted. On recovery he vomited; he was examined by a doctor who reassured the parents. The following day he was seen again by the doctor and nothing of note was found. On the second day after the accident, however, he complained of pain in the upper abdomen, referred to the right shoulder, and was brought to hospital.

On admission, the pulse was 120 and blood pressure 110/70. There was no residue of shock. The abdomen showed general rigidity and tenderness but no shifting dullness. Rectal examination however, revealed a boggy tenderness. The urine was negative.

At operation the abdomen contained considerable dark fluid blood and clots. The liver showed a laceration in the cleft between the right and left lobes, still bleeding. This was packed with gauze and the abdomen closed. Post-operation recovery was uneventful, the pack being removed on the ninth day.

## CASE 5

(M.G.H., No. 4029-39). A male aged 22 years, while driving his car felt severe pain in the left upper abdomen. He had to stop, and lie down by the roadside, and shortly was brought to hospital. At this time the pain extended over the whole upper abdomen and radiated to both shoulders. Evidences of shock were pronounced with a pulse of 140 and a blood pressure of 80/40. The abdomen showed moderate general distension

but no rigidity. Tenderness was present equally over the whole upper abdomen. Dullness was present in both flanks but did not shift on turning. The urine was negative. He was given 1,000 c.c. of 5 per cent glucose saline at once, and shortly afterwards 500 c.c. of donor blood; following this, his condition improved slightly. Six hours after admission however, his blood pressure quite suddenly fell to 40/30 and further intravenous therapy was commenced.

Operation revealed the abdomen to be filled with dark blood and clots. Blood was oozing from a vein in the splenic pedicle, and there was blood also between the leaves of the gastro-splenic ligament. Splenectomy was carried out. All the blood was cleaned out of the abdomen but was not considered good for transfusion purposes. Five hundred c.c. of donor blood was transfused after operation.

The patient failed to rally after operation and died. Pathological examination of the spleen showed Banti's disease and thrombosis of the splenic veins.

## CASE 6

(M.G.H., No. 1025-36). A male aged 36 years was driving his car in low gear when he ran into a telephone pole. He braced himself with hands and feet, so that his trunk did not strike the wheel. He felt a sudden, sharp and steady pain in the left upper quadrant. He also felt weak and perspired freely. He was brought to hospital at once and found to be in mild shock with a pulse of 80 and a blood pressure of 115/80. The pain did not radiate. The abdomen showed moderate resistance and tenderness in the left half, while there was shifting dullness in both flanks. The urine was negative.

Immediate operation revealed considerable fluid blood in the peritoneal cavity, and 350 c.c. of this was recovered for auto-transfusion. In the wound several dilated varicose veins were encountered and ligated. The spleen was found to be lacerated at the attachment of diaphragmatic adhesions. The spleen was removed and the abdomen closed without drainage. Recovery was uneventful.

## CASE 7

(M.G.H., No. 4059-37). A male aged 55 years had a cholecystectomy for subsiding cholecystitis. A small localized abscess had been found at the operation near Hartmann's pouch. This was evacuated and the area drained with cigarette drains. Recovery was uneventful and the drains removed on the eighth post-operative day. Two days later the patient suddenly asked for the bed-pan and showed a blood-soaked dressing to the nurse. The pulse was 120 and blood pressure 90/70. The wound was packed tightly and two 500 c.c. donor transfusions were given within twenty-four hours. There was no recurrence of hæmorrhage and the pack was removed eight days later. Further recovery was uneventful.

## CASE 8

(M.G.H., No. 493-39). A male aged 43 years fell down a full flight of stairs and injured his left side. On admission to hospital he was suffering considerable pain in his left lower chest and was in mild shock, with a pulse of 112 and a blood pressure of 90/60. The abdomen showed contusions in the left upper quadrant extending up over the lower ribs. In this area there was marked splinting and tenderness. The rest of his abdomen was mildly splinted but showed no tenderness. There was no movable dullness. The blood showed 5,250,000 red cells, 13,000 white cells and 90 per cent hgb. An x-ray examination showed fracture of the left ninth rib. Under observation the patient recovered from shock in 24 hours. At this time a tender spleen was palpable for two finger-breadths below the left costal margin. He was treated conservatively, and, apart from a rather persistent adynamic ileus, no other complication occurred. In ten days' time he went home by ambulance, and remained in bed for a further two weeks. His spleen remained palpable for five weeks after discharge. At no time could any definite evidence of gross bleeding into the peritoneal cavity be made out.



## CASE 9

(M.G.H., No. 3468-37). A male aged 47 years received a severe blow on his left chest while at work. On admission he was in mild shock but showed no evidence of internal injuries. The following day he had recovered from shock. X-ray examination showed fracture of several lower ribs on the left side. He was strapped and treated conservatively. Five days after admission he first complained of pain in his left lower chest. Shortly afterwards he became comatose. His pulse was rapid (112) and weak and his systolic blood pressure 80. Examined by a medical consultant he was thought to have suffered a coronary attack. Ten days later he suffered a second similar attack and died quite suddenly. An autopsy showed a ruptured hæmatoma of the spleen with massive intra-abdominal hæmorrhage.

## CASE 10

(M.G.H., No. 2847-38). A female aged 44 years collapsed while at work as a hospital maid, complaining of generalized abdominal pain and diarrhoea. The pain radiated to both shoulders and was aggravated by coughing and breathing. She also had vomited twice. Her last monthly period had begun 23 days previously and was normal. Ten days later however she spotted again. On admission she was in marked shock, with a pulse of 120 and a blood pressure of 96/60. A blood count showed 1,740,000 red cells, and a Hgb. of 30 per cent. The abdomen showed splinting and dullness in the lower half and shifting dullness in both flanks. Pelvic examination revealed a grape-like mass in the cul-de-sac which was very tender. After a donor transfusion operation was carried out. This showed the abdomen filled with blood and clots, and a ruptured right-sided ectopic pregnancy. The blood was not saved for transfusion. Peritonitis ensued and death occurred six days later.

## CASE 11

(M.G.H., No. 9847-40). A male aged 53 years was struck a glancing blow by the engine of a train as he jumped off the track. The impact was felt chiefly on the right lower chest behind. He was thrown into the ditch. On admission he was not in any appreciable shock, but complained of pain in his right flank and down the right side of his abdomen. There was definite local splinting and tenderness in this region, but no definite signs of fluid were made out. His right ribs were not particularly tender nor could one elicit definite liver tenderness. The urine contained no abnormalities. He ran a mild febrile course and had the same abdominal signs for the next ten days following which he was discharged to his home for further convalescence. Two weeks later, after he had been out and about for only two days, he was readmitted with a mild but definite recurrence of his original symptoms and signs. A very thorough investigation showed nothing to account for the condition except the accident. He was considered to have suffered a contusion of the liver with minimal intraperitoneal bleeding. His further recovery was uneventful.

## SUMMARY

1. Hæmoperitoneum resulting from internal injuries as well as arising spontaneously, has

been discussed in general. The literature has been reviewed, and our own five-year period analyzed.

2. A suggested classification for hæmoperitoneum is offered, including only cases that have been actually encountered.

3. The surgical aspects of hæmoperitoneum have been taken up in some detail. Particular emphasis has been laid upon the value of hæmoconcentration as the most accurate criterion for determining both diagnosis and treatment.

4. Shock should not be considered a contra-indication to early operation, due precautions having been taken to combat it. In these precautions the use of recovered intra-abdominal blood for transfusion is stressed. Attention is also called to the recent development in the use of blood serum to the same end.

## RÉSUMÉ

Les cas d'hémorragies intra-abdominales traités au Montreal General Hospital au cours des cinq dernières années sont analysés et discutés. Les causes de telles hémorragies, étudiées en bloc, sont variées. Elles peuvent se résumer comme suit: tous les traumatismes abdominaux; les hémorragies spontanées à la suite d'affections localisées aux organes pelviens, à la rate et à ses vaisseaux, au foie et à ses vaisseaux, au pancréas, aux surrénales, à l'estomac et aux intestins, aux organes voisins; les hémorragies post-opératoires; les hémorragies symptomatiques de dyscrasies sanguines; les hémorragies d'origine congénitale. Les hémorragies non drainées sont absorbées et les caillots résiduels s'organisent donnant lieu à des adhérences. Les effets immédiats sont ceux du shock, auxquels s'ajoutent les éléments de la toxémie. Les symptômes cardinaux sont la douleur à des degrés divers; le shock, suivant très rapidement l'apparition de la douleur; la distension de la paroi; l'augmentation de la douleur à la pression; la matité à la percussion; les malaises rectaux; la diminution de la respiration abdominale; les nausées et vomissements; l'hyperthermie qui suit le shock. Le diagnostic sera aidé par la surveillance du pouls et de la T.A., par l'étude de la concentration sanguine et de la leucocytose, et, au besoin, par la paracentèse abdominale. Au point de vue thérapeutique il faut admettre que le shock n'est pas une contre-indication à l'opération précoce dans les cas où l'hémorragie ne paraît pas cesser. Dans les hémorragies lentes, l'état du malade guidera le chirurgien. Les hémorragies foudroyantes ne seront pas opérées.

JEAN SAUCIER

There will be no more "white bread" available in the Union of South Africa for a long time. The Union has had to import so-called "hard wheat" from Canada to make up for the deficiency in the grade of home-produced wheat for bread-making, and the wheat cannot

now be imported owing to the requirements of shipping for war purposes. The Government has therefore decided to introduce a standard loaf in which only whole wheat is used. Dietitians maintain that this bread is more nutritious than white bread or the brown variety made of unsifted flour.



## A CASE IN WHICH BOTH PULMONARY VEINS EMPTIED INTO A PERSISTENT LEFT SUPERIOR VENA CAVA\*

By J. F. A. McMANUS

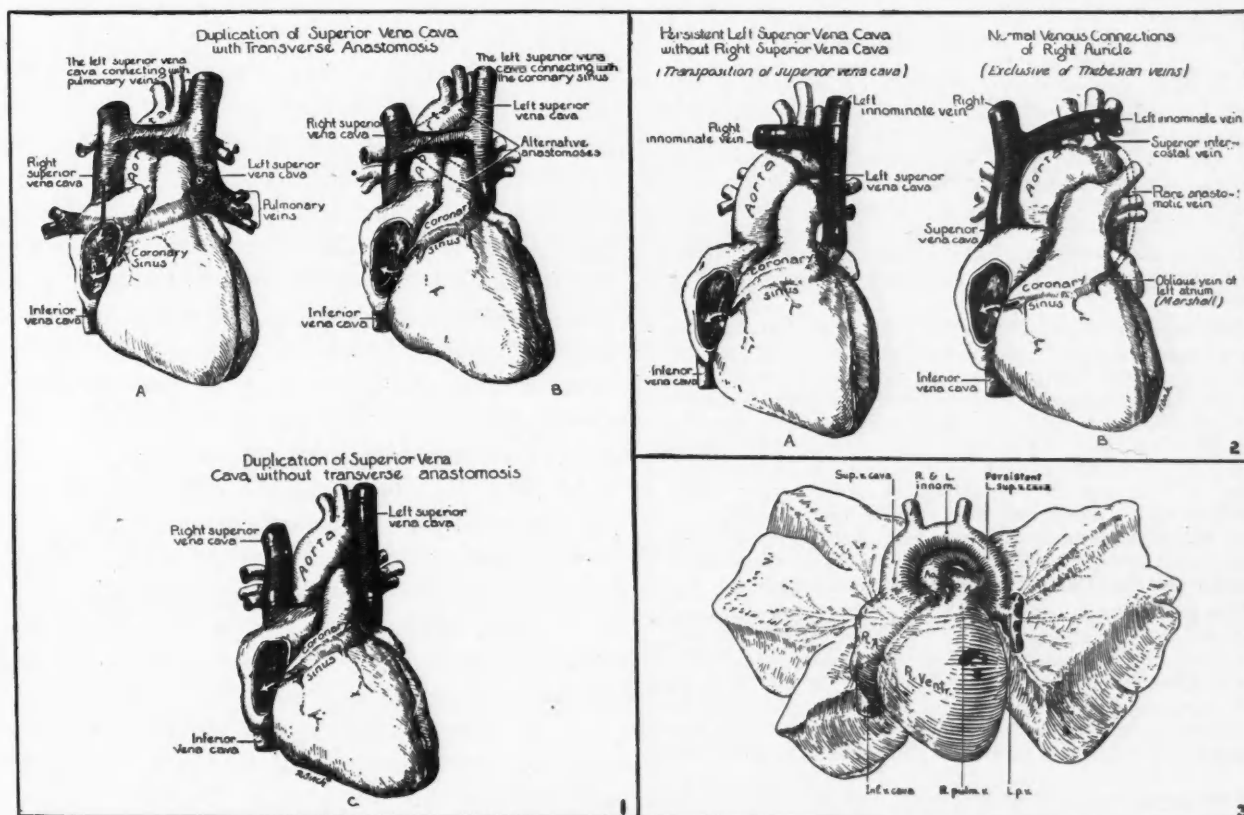
Kingston, Ont.

THE anomaly resulting from the persistence of the left precardinal veins to form a left superior vena cava as found ordinarily is quite compatible with a long and even a laborious life. There seems to be no recognizable limitation of the range of activity in the individual bearing the usual anomaly, and cases have been described as purely accidental findings in subjects at the extremes of life. These then are of largely academic interest as illustrating the vagaries of development.

purpose of this report to describe the clinical and post-mortem findings in one of the rarer cases of persistent left superior vena cava, and to attempt to formulate a classification of the anomalies upon an embryological basis.

### CASE HISTORY

The child, a white male, 12 weeks old, had been delivered normally. Nothing exceptional had been observed other than that he did not take his feedings well and that his lips became blue when he cried, at which times also the respirations seemed to become rapid. Physical examination in the dispensary on two instances



A very few cases of persistent left superior vena cava have an associated anomaly of the pulmonary veins which seems to shorten the life of the individual. Several of these have been described; in some the nature of the anomaly has been recognized. There has been no attempt to organize these fatal cases in terms of the maldevelopment of the precardinal veins, which appears to be the essential error. It is the

several days before death failed to reveal anything beyond a mild bronchitis.

Admitted moribund, the child was cyanotic, gasped for breath, and had a temperature of 104°. Examination showed a systolic murmur and a gallop rhythm, and on fluoroscopy the heart was enormously enlarged. All treatment failed and the child died two and a half hours after admission.

The following clinical impression is that of Dr. H. B. Taussig, to whom I am indebted also for the notes abstracted above.

*Clinical impression.*—A congenital malformation of the heart. The nature of the malformation was not known. The outstanding feature was enormous right-sided cardiac enlargement with only terminal cyanosis. The two possibilities considered were (1) an inter-

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auricular septal defect and (2) complete transposition of the great vessels. Against the former was the absence of murmurs and thrills and the abrupt onset of cardiac failure; against the latter was the late, indeed terminal, development, of cyanosis. In brief, this case presented a new clinical syndrome."

Autopsy was performed approximately 20 hours after death. The significant post-mortem features were these.

The body was that of a white male infant of about three months, measuring 61 cm. in length and weighing about 5 kilograms. There was some post-mortem lividity, but oedema did not seem marked, nor did cyanosis. The limbs showed rigor mortis; the fingers were not clubbed. The abdomen was somewhat protuberant but not markedly so. The scrotal sac showed a hydrocele on the right side; the external genitalia were otherwise normal. The eyes, nose, mouth, ears and face showed nothing remarkable.

**Abdominal cavity.**—The abdominal cavity contained an excess of fluid but not more than 75 c.c. The organs were normal in size and position. The surface of the liver showed the purple mottling of acute congestion.

**Thoracic cavity.**—The thoracic cavity showed great distortion of the normal relations by the enormously enlarged heart which took up the middle half of the chest cavity (Fig. 3). Large veins, also dilated, continued this width upward, and the lungs rested in cavities each about one-half the size of the normal pleural space. The pericardium contained some slight excess of fluid as did each of the pleural spaces.

**Thymus.**—The thymus was about normal in size and other features.

**Heart.**—The heart was much increased in size, the enlargement affecting the right side predominantly so that the anterior descending branch of the left coronary was upon the left margin of the anterior surface of the heart. The superior venæ cavæ, of which there were two, and the transverse anastomotic channel between them were greatly dilated, as was the normal, single, inferior vena cava.

The venous channel which drained the pulmonary veins from the right lung passed transversely across behind the pericardium to join the pulmonary veins from the left lung. The blood from the two pulmonary veins then emptied directly into the persistent left superior vena cava and by the transverse anastomosis was carried to the right superior vena cava and so into the right heart. There was slight patency of the foramen ovale, allowing some blood to enter the systemic circulation from the right auricle. There was also slight patency of the ductus arteriosus which allowed some more blood to enter the aorta and be distributed to the body.

The pericardium was smooth throughout and the small quantity of subepicardial fat allowed the coronary arteries to be visualized. Their course seemed normal. The right auricle was greatly increased in size and its wall somewhat thickened. Its interior presents no features, apart from the smallness of the coronary sinus opening, which were incompatible with the dilatation and hypertrophy of the chamber. There seemed to be a small area of the foramen ovale not covered by the membranous valve. The tricuspid valve was dilated to the point of incompetence, measuring 5 cm. in diameter, but showed no other abnormalities. The right ventricular wall was 1 cm. in thickness, and the chamber dilated and hypertrophied. The pulmonary valve showed no remarkable features, although the valve ring seemed dilated. The usual position of the ductus arteriosus was occupied by a fibrous cord through which a fine probe could just be passed, so that the lumen was not more than 1 mm. in diameter.

No vessels were connected with the left auricle. The auricle was exceedingly small, as was the mitral valve. The mitral valve ring measured only 2 cm., but the individual cusps showed no particular abnormality apart from size. The left ventricle was small. The wall measured 1 cm. in thickness. The aortic valve ring was small, as was the aorta, and measured only 2 cm. The coronary arteries appeared roughly normal in origin and

course, although the opening of the right coronary consists of two large and a third, smaller, orifice.

The lungs, liver, spleen and kidneys showed evidences of acute congestion. The other organs showed nothing noteworthy.

**In summary.**—The condition was considered to be an unusual anomaly of the pulmonary venous return in which the blood from the lungs was carried by a persistent left superior vena cava and a transverse anastomotic channel to the right side of the heart. The systemic circulation received only the blood which passed through the relatively small openings in the foramen ovale and the ductus arteriosus.

## DISCUSSION

The precardinal veins of the embryo supply the venous drainage of the anterior portions of the body from the region of the eye to the sinus venosus. They are the first purely intra-embryonic longitudinal veins to appear, and, one on either side, they can be separated into three parts, a cephalic part, a nuchal part, and a thoracic portion (Cunningham<sup>4</sup>). The thoracic portion develops in a different way on the two sides. A transverse anastomosis is formed between the two precardinal veins just posterior to the entrance of the veins from the fore limb of either side. On the right side the right innominate vein is formed from the part of the precardinal vein anterior to the transverse anastomosis. On the left side the innominate vein is formed from the transverse anastomosis, and from the precardinal vein of that side anterior to it. Posterior to the transverse anastomosis on the right there is fusion of the posterior cardinal vein, to form anterior to this latter junction the extra-pericardial part of the superior vena cava and posterior to it the right duct of Cuvier, which becomes the intra-pericardial part of the superior vena cava. The part of the left precardinal vein posterior to the transverse anastomosis opens at first into the left horn of the sinus venosus of the heart. After the junction of the left precardinal vein with the left post-cardinal vein the posterior part becomes the left duct of Cuvier. This is represented in the adult by the oblique vein of the left atrium or the oblique vein of Marshall.<sup>13</sup> The anterior part becomes the anterior part of the left superior intercostal vein, which opens into the left innominate vein. A vestigial fold frequently unites the anterior and posterior parts of the left duct of Cuvier.

This system of differentiation and development shows frequent disorders, and anomalies of the derivatives of the precardinal veins are not uncommon. The persistence of the left precardinal vein to form a left superior vena cava



seems to appear most frequently (Fig. 1), Papez<sup>18</sup> surveys the literature and states that some 200 cases of persistence of the left superior vena cava have been described.

Marshall<sup>13</sup> in 1850 appears to have been the first to explain the embryological basis for the persistence of the left superior vena cava. McCotter<sup>14</sup> and Beattie<sup>1</sup> have reviewed the reported cases in detail and added cases of their own, discussing the embryology at some length.

The usual anomaly seen in persistence of the left superior vena cava shows a venous channel terminating in the left extremity of the coronary sinus draining from the upper part of the body. There may or may not be any transverse anastomosis between the paired superior venæ cavæ. Where there is none the venous drainage of either side superiorly is independent. The coronary sinus in such cases is large, about the same calibre as the venæ cavæ themselves. Where there is a transverse anastomotic channel the degree of angulation of the vessel usually determines the relative size, as Villenin pointed out, of the two superior venæ cavæ and the coronary sinus. Where the angulation is to the right the right superior vena cava is the larger and the left superior vena cava and the coronary sinus are relatively small. Contrariwise, where the angulation is to the left, the left superior vena cava and coronary sinus increase in size at the expense of the right superior vena cava. This can be explained by the amount of blood carried by either of the alternate routes, and when the transverse anastomotic channel is actually transverse the two superior venæ cavæ are approximately of the same size with the coronary sinus large but not of the size seen when the left superior vena cava drains the greater part of the blood from the upper extremities, upper thorax, head and neck.

Cases have been reported in which the right superior vena cava has failed to develop, the left duct of Cuvier forming a superior vena cava on the left side. The coronary sinus can hardly be identified as such, and the superior vena cava on the left passes anterior to the root of the left lung, turning medially to occupy in its terminal portion the usual position of the coronary sinus and emptying into the right auricle.

Intermediate stages of persistence of the left duct of Cuvier apart from the persistence of the left superior vena cava can be recognized but are out of place in this discussion. To mention

a rare one, the opening of the coronary sinus into the heart may be obliterated with the cardiac veins draining upward to the left innominate vein.

Gruber<sup>7</sup> appears to have reported the first case in which the pulmonary veins drain into a persistent left superior vena cava. Similar cases were reported by Chaffey,<sup>2</sup> Epstein,<sup>6</sup> Schroder<sup>21</sup> and Michaelson;<sup>15</sup> Palmer<sup>17</sup> described such a case in a discussion of another type of anomaly. The cases are either rare or unrecognized and deserve report upon either basis.

From the viewpoint of our discussion the essential error appears to be the persistence of the left superior vena cava. The drainage of the pulmonary veins into this anomalous vessel and others of the type will be discussed elsewhere (McManus and Smith, to be published) but it may be said that these types of malformations are best understood if we consider the pulmonary veins as they are in their first appearance. At this point they are represented by capillary channels with multiple connections to the heart and the neighbouring vessels. The usual development determines the pulmonary venous return through the usual course, a preponderance of flow through an abnormal course results in anomalies of which the present case is a type.

It seems reasonable, finally, to tabulate the anomalies in cases with persistent left superior vena cava (*cf.* Fig. 1). Selected illustrative cases appearing since McCotter's<sup>14</sup> article are appended, and cases of persistence of the left superior vena cava with drainage of the pulmonary veins which are not included by McCotter are added.

*Persistent left superior vena cava:*

- I. With right superior vena cava (duplication of superior vena cava) Fig. 3.
  - A. Persistent left superior vena cava connected to coronary sinus
    - (a) Cross anastomosis present (Fig. 1B).  
Huffmire and Bower<sup>10</sup>; Donadio<sup>5</sup>; Beattie<sup>1</sup>; Chlyvitch<sup>3</sup>; Seshachalam and Nagendren.<sup>20</sup>
    - (b) Cross anastomosis absent (Fig. 1C).  
LeCount (1916); Harris and Whitney<sup>9</sup>; Hurley and Coates<sup>11</sup>; Odgers<sup>16</sup>; Thompson<sup>22</sup>; Beattie<sup>1</sup>; Kodoma.<sup>12</sup>
  - B. Persistent left superior vena draining pulmonary veins (Fig. 1A).  
Gruber<sup>7</sup>; Chaffey<sup>2</sup>; Epstein<sup>6</sup>; Schroder<sup>21</sup>; Michaelson<sup>15</sup>; Palmer<sup>17</sup>; McManus (present case).
- II. Without right superior vena cava (Fig. 2A).  
Halpert<sup>8</sup>; Beattie.<sup>1</sup>



## SUMMARY

1. A case of persistent left superior vena cava draining both pulmonary veins is reported.
2. The underlying embryology is briefly discussed.
3. A classification of the anomalies of this type is suggested, and cases illustrating the various types are indicated in the literature.

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## Case Report

## A CASE OF FAMILIAL HÆMOLYTIC ICTERUS

BY L. C. MONTGOMERY

Montreal

The following case of familial hæmolytic jaundice with hæmolytic crisis, treated by splenectomy and cholecystectomy, and followed in five months by a full term pregnancy, has been considered worthy of record.

Mrs. W.B., aged 28 years, housewife.

*Complaints.*—Intermittent jaundice for 15 years; fever for 3 days; general malaise for 3 days.

*Family history.*—No definite family history of jaundice on either side.

*Personal history.*—Paratyphoid in childhood; pneumonia at 10 years; a miscarriage at 3 months in 1936 and at 2½ months in 1937.

*Present illness.*—The following details are from the records of Dr. Maurice Freemont-Smith, Boston.

"In 1919 a bilious upset with questionable jaundice. In 1921 nausea and vomiting with questionable jaundice. No jaundice noted earlier in life. For 2 years prior to 1924 she had noticed a yellow tinge off and on.

In 1923 an attack of severe epigastric pain lasting one hour; no vomiting, and an x-ray showed no gallstones. In 1924 examination showed liver dullness to extend from the fourth rib above to the costal margin below. The edge was not felt. The spleen was felt, 5 cm. below the costal margin. Definite jaundice of both sclerae. The blood count was: red blood cells 3,800,000; white blood cells 14,000; hgb. 75 per cent (Dare). The blood smear showed marked variation in size of the red blood cells, some cells definitely achromic, no nucleated or stippled cells, many Howell-Jolly bodies. Fragility: hæmolysis began at 0.520 per cent NaCl and was completed at 0.380 per cent NaCl.

In January, 1926, splenectomy was considered, but advised against by Dr. Roger T. Lee, who was worried by the increase in the size of the spleen. In January, 1927, the blood count was red blood cells 3,500,000; white blood cells 13,800; hgb. 63 per cent (Dare).

In 1933 the patient was given 0.5 c.c. of typhoid vaccine. This produced a severe reaction with fever and considerable jaundice. Blood count: red blood cells 3,380,000; white blood cells 9,900; hgb. 60 per cent. Differential count normal. Platelets normal.

On July 26, 1937, patient was seen with the complaint of two miscarriages. She had been entirely well during the year-and-a-half of her marriage and the only reason for the examination was to determine whether any thing could be done to prevent further miscarriages.

There was evidence of a mild degree of jaundice. No enlargement of the lymphatic glands. The spleen was palpable at the level of the umbilicus. The liver edge was not felt. Blood pressure 118/60. Differential count normal. Fragility: hæmolysis started at greater than 0.540 per cent NaCl and was complete at 0.400 per cent NaCl.

The urine was negative. Guaiac test on stool negative. Basal metabolic rate, plus 20 per cent.

An examination of the gall bladder (Graham method) done at the Massachusetts General Hospital showed gallstones, a shadow suggesting an impacted stone in the cystic duct, and a hydrops of the gall bladder. Also fairly definite evidence of enlargement of the spleen.

The patient was seen in consultation by Dr. William David Smith, of Boston, who agreed in the diagnosis of hæmolytic icterus, and more likely of the congenital than the acquired type.

He considered splenectomy indicated on the two following counts: "(1) The hazard of further stone formation, and future possibility of stone in the hepatic or common duct, with consequent obligatory operation. (2) Although the patient feels that her health is moderately good, following a successful splenectomy she would realize that she had previously not been up to par."

On August 2, 1937, seven days after the above examinations, the patient awakened feeling tired. During the morning she suddenly felt dizzy, had to lie down, and by noon there was general malaise. No nausea or vomiting. The following day she was drowsy. Her temperature was 102° F., and there was definite jaundice. She was seen by Dr. Bayne, of La Tuque, Que., who suspected a hæmolytic crisis. Her condition grew steadily worse. She could be roused only with difficulty, and did not recognize her husband. At times she seemed to be irrational. There was no abdominal pain.

On August 5th, three days after the onset of her acute illness, she was admitted to the Montreal General Hospital, having journeyed two hundred miles by train on a stretcher.

Examination at this time showed a tall, thin, extremely ill looking female, with a definite icterus but also a marked underlying pallor, temperature 102.6° F.: respirations 24 per minute.

She was oriented as to time and place. The hgb. was estimated at 25 per cent (Sahli). There was no evidence of infection in the upper respiratory tract. The lungs were clear. The pulse was 136 per minute.

#### IIIR

Blood pressure 120/50. R.C.D. 2.5 cm./10.5 cm. There was a soft apical and basal systolic murmur. The other sounds were clear.

The abdomen was soft. Liver not palpable, but in the left upper quadrant was a mass very suggestive of an enlarged spleen, although no definite sharp edge could be felt. Physical examination otherwise was negative.

The impression at the bedside, immediately following the examination, and before any report had been received from Dr. Freemont-Smith or the hæmatological department, was as follows: "One is struck by her toxic appearance and the anæmia, rather than by the degree of jaundice. There is a mass in the left upper quadrant which I think is spleen, but I cannot feel any definite margin. The history is very suggestive of a hæmolytic crisis associated with a familial type of jaundice, but my clinical impression now is that there is a marked septic process."

A routine blood count done by the intern on the ward showed red blood cells 990,000; white blood cells 4,350; hgb. less than 20 per cent (Hellige).

A whole smear studied showed only 10 leucocytes, of which 7 were polymorphonuclears and 3 lymphocytes. Fresh specimen of urine—spectroscopic examination, negative for hæmoglobin.

As soon as possible the patient had a blood-grouping done. She was found to be group IV, and within the next twelve hours she was given 700 c.c. of citrated blood.

Blood for a complete hæmatological study did not get taken until after the patient had received her first transfusion. The report read as follows: red blood cells 1,530,000; white blood cells 6,900; hgb. 32 per cent (H.); platelets 68,000; cell diameter 7.7 microns.

Differential: polymorphonuclears 85 per cent; lymphocytes 12 per cent; monocytes 3 per cent. There is considerable variation in the size, shape and staining of the red blood cells. Quite a number of microcytes and macrocytes were seen, but no immature white blood cells, although the majority of the polymorphonuclears were type T. The Hess test was negative. Reticulocyte count less than 1 per cent. Fragility: hæmolysis began at 0.350 per cent NaCl and was complete at 0.250 per cent NaCl. A re-check showed that hæmolysis began at 0.325 per cent NaCl and was complete at 0.255 per cent NaCl. The blood Wassermann test was negative.

On the day of admission the patient was seen by Dr. A. T. Bazin, of the surgical department, whose impression was "a crisis of hæmolytic jaundice; surgery not indicated at present, and to continue with repeated transfusions".

By August 7, 1937, two days after admission, the patient had received 2,300 c.c. of citrated blood. There was still considerable fever, but she was brighter than on admission and the icterus was less evident. The soft apical and pulmonary systolic murmurs persisted, and the spleen was palpable as far anteriorly as the umbilicus and quite firm. The liver was not palpable. Blood count, August 6th: red blood cells 1,539,000; white blood cells 6,900; hgb. 32 per cent (H.); platelets 68,000; reticulocytes less than 1 per cent.

On August 8th the temperature was still elevated to 102° F., and, for the first time, impaired resonance was noted in the lower half of the right chest posteriorly. The breath sounds were bronchovesicular over this area, with showers of moist inspiratory râles.

The spleen was palpable as far anteriorly as the mid-line. The liver was not palpable. The patient had by now received 3,550 c.c. of citrated blood.

Red blood cells 2,180,000; hgb. 41 per cent (H.). Reticulocyte count less than 1 per cent. Spectroscopic examination of urine negative for hæmoglobin. Urine

urobilinogen 1/1,000 plus. A blood culture was negative.

On August 10th, five days after admission, the patient's transfusions amounted to 4,150 c.c. There was evidence of colour in the patient's cheeks, but still a slight icteroid tint to the sclerotics. The temperature had dropped to normal, by crisis, on August 9th.

There was dullness on percussion at the base of both lungs posteriorly, with moist râles and a slightly nasal pitch to the voice sounds. An x-ray, taken by a portable machine, suggested bronchopneumonia at the base of both lower lobes.

Red blood cells 3,620,000; white blood cells 4,950; hgb. 57 per cent (H.). Reticulocyte count less than 1 per cent.

Spectroscopic examination of the urine negative for hgb. Urine urobilinogen 1/1,000 plus.

At this stage, Dr. George Minot was consulted by telephone. His opinion was that the low reticulocyte count was not an unfavourable feature and was to be expected as long as the patient was receiving transfusions. He also stated that one should not delay too long about doing a splenectomy, and to judge the time of operation more by the patient's general clinical condition than by the actual blood count.

This opinion was later confirmed by letter, in which he stated, "The recent attack of apparently an acute hæmolytic crisis is certainly distressing, and especially so since it has been accompanied by bone marrow depression, especially of platelets and red cells."

"This state of affairs is rare. Sometimes liver dysfunction or periportal infection engrafted on the disordered pigment metabolism of the hæmolytic jaundice has been thought to be responsible for such a condition. Under these conditions, as apparently has occurred in this case, the red cells tend to a larger diameter than when uncomplicated hæmolytic jaundice exists."

"I wonder if the râles at the right lung base signify infection there, to account for the present situation. Infection is, of course, the usual episode to precipitate hæmolytic crisis."

By August 14th, five days after the last transfusion, the patient was showing steady improvement, she continued to be afebrile. The lungs were resonant throughout, and there were no adventitious sounds. No icteroid tint to the sclerotics.

On August 17th she was given a transfusion of 500 c.c. of citrated blood; and on August 18th, pre-operatively, the blood examination showed red blood cells 4,080,000; hgb. 75 per cent (H.); reticulocytes 5.5 per cent. On this date a splenectomy was done by Dr. A. T. Bazin under intratracheal ether. There were no perisplenic adhesions, but hydrops of the gall bladder was found with a stone impacted in the cystic duct. There was also a definite hardness which was apparently in the bladder wall itself. The pathological diagnosis was familial hæmolytic jaundice.

The blood count done post-operatively on August 18, 1939, was red blood cells 4,930,000; white blood cells 32,000; hgb. 88 per cent (H.); polymorphonuclears 94 per cent; lymphocytes 3 per cent; monocytes 3 per cent; reticulocytes 5.5 per cent. The patient ran a very satisfactory post-operative course.

At the time of the patient's discharge on September 10th, thirty-six days after admission, there was no icteroid tint to the sclerotics. Blood pressure 110/60.

#### IIIR

R.C.D. 2.5 cm./8 cm. Soft apical systolic murmur. Liver not palpable. Urine: specific gravity 1.010, albumen 0, glucose 0, bile 0, casts 0.

Red blood cells 4,000,000; white blood cells 11,600; hgb. 76 per cent (H.); reticulocytes 0.8 per cent; platelets 415,000; differential count showed nothing unusual. The size and shape of the red blood cells still varied slightly. Fragility: hæmolysis began at 0.450 per cent NaCl and was complete at 0.350 per cent NaCl. Urine urobilinogen was present in less than 1/10 dilution.



In November, 1937, three months after the onset of her acute hæmolytic crisis, the patient returned to hospital for a check up. She stated that she felt perfectly well and had no epigastric or abdominal distress.

The physical examination was quite normal. The heart murmurs had disappeared. The liver was not enlarged and there was no abdominal tenderness. Blood pressure 110/60.

Blood examination showed: red blood cells 4,370,000; white blood cells 12,300; hgb. 74 per cent (H.). Differential: polymorphonuclears 23 per cent; lymphocytes 68 per cent; monocytes 5 per cent; eosinophiles 4 per cent.

In January, 1938, five months after her hæmolytic crisis, the patient returned to hospital for a cholecystectomy. She had been perfectly well in the interval, with no symptoms referable to the gall bladder. The physical examination was again quite normal. Blood pressure 130/80.

Blood examination was: red blood cells 4,640,000; white blood cells 10,000; hgb. 90 per cent (H.). The differential showed nothing abnormal.

A cholecystectomy and appendectomy was done by Dr. A. T. Bazin under intratracheal ether. The gall bladder was enlarged to the size of a large pear with a thickened wall, but free from adhesions. There was an impacted stone in the cystic duct. The pathological diagnosis was "hydrops of the gall bladder, chronic cholecystitis and cholelithiasis". The patient made an uneventful recovery.

She became pregnant in February, 1938, and in August, 1938, in the sixth month of pregnancy, her blood sugar was 0.090 per cent.

Differential blood count: polymorphonuclears 67 per cent; lymphocytes 26 per cent; monocytes 6 per cent; eosinophiles 1 per cent.

She returned to hospital in November, 1938, and was delivered of a full-term female child. Her physical examination was again essentially normal. Blood pressure 110—140/80.

Blood examination prior to delivery was: red blood cells 4,590,000; white blood cells 11,000; hgb. 83 per cent (H.), and the bleeding time showed a slight tendency to bleed.

Before discharge, an examination of the baby's blood showed: red blood cells 4,680,000; white blood cells 12,500; hgb. 90 per cent (H.); polymorphonuclears 37 per cent; lymphocytes 53 per cent; monocytes 4 per cent; myelocytes 2 per cent; eosinophiles 4 per cent; reticulocytes 0.2 per cent; platelets 243,000. Fragility: hæmolysis began at 0.300 per cent NaCl and

was complete at 0.250 per cent NaCl. A normal hæmogram for this age.

To date this patient has gone along quite normally, and a blood examination done thirteen months after pregnancy shows: red blood cells 4,640,000; white blood cells 10,900; hgb. 80 per cent (H.); with a differential count of polymorphonuclears 59 per cent; lymphocytes 30 per cent; monocytes 4 per cent; eosinophiles 6 per cent; basophiles 1 per cent. There is a moderate variation in the size of the erythrocytes. The cells are fairly well coloured. A very rare monocyte noted. Platelets 424,000; reticulocyte range 2.30 per cent; cell diameter 7.3 microns; cell volume 32 per cent. Fragility: hæmolysis began at 0.475 per cent NaCl and was complete at 0.375 per cent NaCl.

### SUMMARY

This patient was suspected of having familial hæmolytic jaundice. A splenectomy had been considered but deferred. Following her marriage there had been two miscarriages. A Graham dye test was done on the gall bladder. Five days after this investigation she developed an acute hæmolytic crisis, requiring numerous transfusions.

During her acute illness she showed signs of bronchopneumonia at the base of both lungs. Sixteen days after the onset of her acute illness an uneventful splenectomy was performed. This was followed in three months by a cholecystectomy and appendectomy.

Six months after the hæmolytic crisis she became pregnant, had an uneventful pregnancy, and was delivered of a full-term female child, which at birth showed by blood examination and physical examination no tendency to inherit hæmolytic jaundice.

I am indebted to Dr. A. T. Bazin for the surgical data on this case, and to Dr. A. D. Campbell for the obstetrical notes.

## Clinical and Laboratory Notes

### A LIQUID SOAP DISPENSER

By A. A. KLASS

Winnipeg

#### SUPPLIES NECESSARY

	Approximate cost
1 red rubber crutch tip (B) .....	10 cents
1 16 oz. bottle to fit crutch tip (A) .....	5 "
5 feet ¼ inch rubber tubing (C) .....	50 "
2 pieces 3 x ¼ inch glass tubing (D) (D1) .....	2 "
1 rubber ear and ulcer syringe (E) .....	20 "
2 pieces wood 3 x 6 x ½ inch (F) .....	2 "
1 2 inch metal hinge (G) .....	5 "

#### ASSEMBLY

Two ¼ inch holes are bored into the crutch tip (B), one through the centre bottom, and the other through the side to open just above the inside bottom.

The pieces of glass tubing (D) and (D1) are fitted through these openings, the horizontal piece of tubing (D1) pointed so as to create a fine stream.

One piece of the rubber tubing (C) is then fitted on the glass connecting piece (D) so that it extends through the full length of the bottle (A).

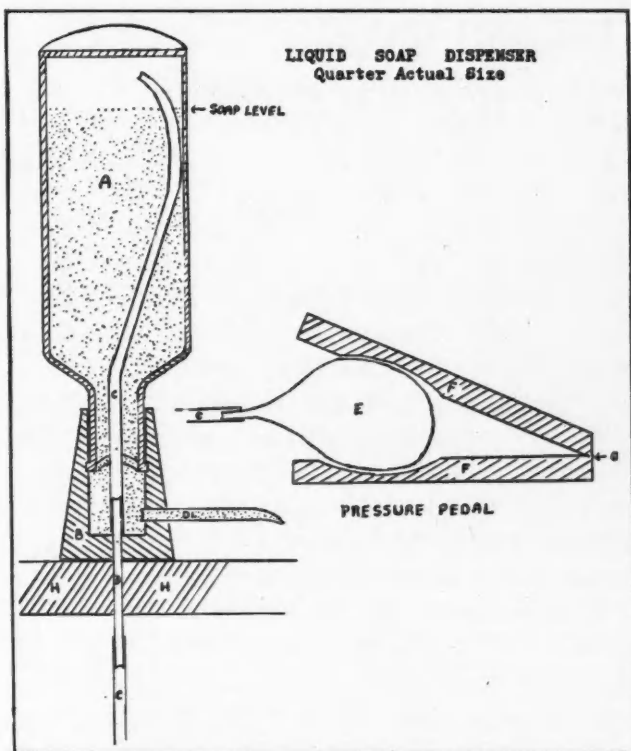
At the other end of this glass connection (D) attach the rest of the rubber tubing (C). The ear and ulcer syringe (E) is connected to the end of this tubing.

The pressure pedal for the bulb (E) is simply made by hinging the two pieces of wood (F), and can be fixed to the floor or left free to move about.



The bottle is set up inverted on a shelf (H) and a hole drilled through the shelf to enable the glass connecting tube (D) to pass through.

The bottle is then filled with liquid soap and the open end of the crutch tip pulled over the neck, the end of the glass connecting piece (D) is put through the hole in the shelf and connected with the rubber tubing (C) attached to the bulb (E).



The advantages claimed are: simplicity and cheapness; freedom from breakage; since there is no metal there is no corrosion and no leakage, even after prolonged use. The apparatus can easily be fixed to the wall with a light metal clip or piece of adhesive.

### A CAST FOR FRACTURES NEAR THE WRIST

By K. A. BAIRD

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The cast herein described combines several features, already described by others, with the use of aluminum wire to permit of lightness and comfort with strength. It may be used for Colles' fracture or similar injuries about the wrist, as well as for fractures of the carpal bones, including the scaphoid.

It is assumed that reduction has been accomplished.

1. A strip of saddlers' felt about  $1\frac{1}{2}$  inches wide is placed around the arm below the elbow. The usual thick felt split in two gives a very good thickness. The ends can be fastened with adhesive.

2. A strip of gauze bandage is cut the exact length from the centre of the felt posteriorly to the knuckles, and laid out on a table as a measure for making a slab.

3. A rather thin dorsal slab made from three or four inch plaster is applied from the felt pad to the knuckles. This is moulded to the curves of the forearm and wrist and held in place by interrupted lengths of wet gauze, not continuous bandaging.

4. A length of aluminum wire (No. 2 or 4\*) previously formed is applied. This wire crosses the palm at the crease, arches around the edges of the hand, and extends up the dorsal slab as two light rods. It serves two purposes; viz., it holds the metacarpals close to the dorsal slab, and strengthens the dorsal slab.



5. A narrow slab of plaster bandage is placed between the wires to fill up the space there, and a few layers of plaster bandage applied lengthwise over this and the wires and rubbed on to the original dorsal slab, thus making a fairly solid slab of plaster, reinforced with the two wires.

6. The cast is now completed by fairly strong circular plaster bandaging around the wrist, and lighter plaster around the upper forearm from the centre of the felt down the width of one bandage (3 or 4 inches). There is thus no plaster anteriorly over the mid-forearm. There may be one or two strips of the gauze first used to hold the dorsal slab in place.

This cast, while comparatively light, is sufficiently strong. The fractured area is held firmly in a short plaster of Paris cast, which is prevented from "wobbling" by the reinforced back slab, anchored near the upper forearm by light plaster bandaging, and at distal end of the metatarsals by the loop of wire. The thumb and fingers are exceptionally free to move, which, while being much appreciated by the patient from the standpoint of comfort, is important to prevent stiffness and promote healing. In brief, this method seems to the writer to carry out a little better the principles so well stressed by Bohler, of fixation of the fracture along with continued function of the limb.

In a case of fracture of the head of the radius and of the scaphoid in the same arm the writer extended the wires in the back slab on up around

\* This wire is used by power companies for long distance transmission of current, and a length can often be obtained from that source.

the elbow with very light plaster around the elbow anteriorly. After four weeks the upper part of cast was removed with shears, the wires cut off below the elbow and bent back, and the

edges of the cast smoothed off with adhesive plaster binding, leaving a cast as already described, except for the felt, to retain the scaphoid for a longer period.

## Editorials

### INDUSTRY, MEDICINE AND WAR

WE record with peculiar pleasure the fact that our Association has taken steps to set up a committee on Industrial Medicine. Dr. J. G. Cunningham, of Toronto, is the Chairman. The need for such a committee cannot be gainsaid. Its establishment is in harmony with the expressed desire of the Association to place all its resources at the disposal of the Federal Government for the fuller prosecution of the war. Its purposes, in general, are to survey the situation and define the scope and objectives of Industrial Medicine; to consider the qualifications and training of physicians and nurses for service in this special branch; and to take stock of our present personnel and training situation. Having obtained this information we should be in a position to formulate suggestions which would be of practical value, leading to the better co-ordination of this particular effort.

The health of the industrial worker has engaged attention almost from time immemorial, and within the last few decades Industrial Hygiene has become recognized as a special branch of Public Health Service. That the health of the operative is of prime importance to himself or herself, to the employer, and, indeed, to the general body politic will, we think, be everywhere admitted. Our laws have taken cognizance of this, and very extensive measures are now in effect to preserve the health of the worker and to indemnify him for loss which he may suffer in the course of his occupation. Large mining and manufacturing corporations, public utility companies, and many other important concerns have for long maintained their own medical units—they find it pays, in better health, in better work, in greater happiness. And with the advent of war this subject assumes much greater importance. The number of operatives has become much larger; many of them are doing unaccustomed

work; many of them are subjected to more serious hazards. It is imperative to protect them, for on them, more than on anything else, depends the winning of the war. Actually, the provision of food, ships, planes, ammunition, and war supplies of all kinds, is, if possible, more important than fighting man power. Accuracy in detail, speed in production, avoidance of accidents and medical disabilities, all are dependent on the physical well-being of the operative. To ensure the best results calls for the co-operative effort of all concerned, employers, administrative and office staffs, operatives, medical men, and, oftentimes, nurses.

It is obvious that to secure all this is no light task. Skill, knowledge, good-will, co-operation and a logical system are all required, and in addition a central co-ordinating body with power to enforce its rulings. The technical matters involved call for the attention of specialists, not amateurs, acting as an Industrial Hygiene Unit. Dr. F. S. Parney, Chief of the Division of Industrial Hygiene, Department of Pensions and National Health, Ottawa, writing in the *National Health Review*, sets forth that "as a minimum such a unit embodies three component parts: (1) a physician specialized in the diagnosis and treatment of occupational diseases and who possesses some practical knowledge of industrial plant layouts, sanitation, etc.; (2) an engineer, preferably a chemical engineer, with special training in ventilation and lighting, and with working experience in industrial plants; (3) and an analytical chemist."

The rôle of the medical man in industry naturally would vary in details according to circumstances. His job might be whole-time or part-time as the case might be, always bearing in mind that his chief objective is to preserve the health of the operative. This may involve the physical and mental exami-



nation of candidates for employment, the categorization of them into groups according to their fitness or unfitness for particular jobs, and in some cases following them up to detect early any signs of ill-health. Those who are to be employed under conditions of special hazard, as in the various industries concerned with lead, zinc, copper, brass, benzol, certain dyes, and the like, should be in the pink of condition before being engaged and should be re-examined at proper intervals to determine their continued fitness or otherwise. This would be a continuous service, and would require laboratory facilities. It has been suggested that governmental regulations should be passed requiring the employment by employers in war industry of

the physicians and nurses necessary for the maintenance of health. Such a measure is in effect in Great Britain.

Re-examination is necessary also when a worker returns to duty, even after a moderate absence, whether from illness, injury, or other cause; when he transfers to a new job differing in quality from his former one; when he desires admission to an insurance or mutual benefit association; when he is resigning or is discharged by his company, particularly if he is retiring on pension, or has been exposed to special hazards, or has at any time been disabled in the course of duty.

We submit that this subject is of wide scope, demands careful thought, and co-ordination of effort.

A.G.N.

## Editorial Comments

### The Polish School of Medicine in Edinburgh

One of the most remarkable evidences of the high morale of the people of Britain is that even at the height of the Blitzkrieg waged by the Luftwaffe their leaders could look ahead and plan for the post-war period, and this not merely for themselves but for their allies—those nations driven out of their own countries and precariously retaining their nationality and their traditions.

For many months past a movement has been on foot to establish a Polish School of Medicine in the Scottish capital. This movement arose from the fact that among the Polish forces which escaped from the continent to Britain there were a number of soldiers who at the time of the outbreak of war were students or graduates in medicine. When the Polish forces moved to Scotland it was found that there was a surplus of medical men among them for the immediate requirements of the Army. Colonel Fortescue, of the Scottish Command, and Lieut.-Colonel Crew, formerly professor of Animal Genetics and then commanding the Military Hospital in Edinburgh, arranged that the Polish medical officers should have refresher courses at the University. These courses developed from a few weeks' duration into periods of six months. Meantime such medical officers as had been teachers in pre-war days in Poland got into touch with their opposite numbers in the Edinburgh Medical School and pursued research problems in which they had been interested. Thus the possibility of establishing a Polish Medical School in Edinburgh gradually emerged, and as early as October last the Polish government took up the idea and instructed Dr. Jurasz, formerly Professor of Surgery in the University

of Poznan, to co-operate with the Dean of the Medical Faculty in Edinburgh in forming a Polish School of Medicine. All these preliminaries culminated in a large and enthusiastic gathering held in the McEwan Hall on March 22nd of this year. The occasion was without precedent in the history of European universities. The Polish government was represented by its head, President Wladyslaw Racziewicz. Principal Sir Thomas Holland, of the University of Edinburgh, presided. The British government sent Sir John Anderson, Lord President of the Council. The company numbered some 1,500 and included many important representatives of both peoples, civil and military. During the ceremony, which began with the Polish and ended with the British National Anthem, the degree of Honorary Doctor of Laws was conferred upon President Racziewicz.

At present there are some eighty Polish medical undergraduates in the School. Of these fifty are lieutenants, cadets or private soldiers in the Army. The teaching staff consists of six professors and nineteen lecturers who are Poles, with Professor Antoni Jurasz as Dean. The Edinburgh University Court has been asked to nominate certain Edinburgh Professors to control the teaching of those subjects in which Polish specialists of professorial standing are not at present available. The University has arranged with the City of Edinburgh authorities to provide facilities for clinical instruction in the Municipal General Hospitals. The financial side of the scheme is being borne by the Polish Government.

The aim of this new medical school is, of course, to continue the teaching of medical students of Polish nationality, so that at the



conclusion of the War there may be some doctors available for dealing with the medical side of the serious situation which will exist in Poland, as in other countries occupied by the Nazis. As is well known, the policy of Germany has been to destroy all native culture as well as the schools and universities of the countries which they have seized. Professor Jurasz, in an article contributed to the *University of Edinburgh Journal*, states that Poland's universities, her schools and her libraries are closed and their equipment destroyed or confiscated, and that all records of her glorious history are being systematically obliterated. Her intelligentsia are

being murdered. He goes on to say: "Strong as is this evil power of destruction, embodied in Germany, stronger still is the spiritual power of resistance shown by the Poland of today. Her spirit is not shattered." "So unshakable and so firm is the confidence in the ultimate triumph of justice and the downfall of evil that already plans for the post-war social reconstruction of Poland are being designed. As a measure of this confidence and of the quality of these plans, the creation of a Polish Medical Faculty, now officially known as the Polish School of Medicine, in the University of Edinburgh, can be cited."

J. MILLER

## Medical Economics

### WHAT IS AN ADEQUATE MEDICAL SERVICE\*

By E. S. MOORHEAD

Winnipeg

One of the problems we may have to face when peace returns is national or provincial health insurance. Are we prepared for it? We have enunciated several general principles, excellent so far as they go, but we have not made much progress in providing the answer to the question, How much treatment of all kinds will be necessary for the welfare of the people? I am stressing the importance of this for two reasons; it takes some years to collect this information, and the cost per head per annum should be based on facts not estimates. If estimates alone are available, then governments will set a figure which the medical profession considers too low, and yet may not have the means to prove its contention.

It is well known, through statistics, that hospitalization will be required at a rate of one and a third days per head per annum. Mr. Wolfenden has shown in his excellent series of articles, with which I hope you are all familiar, the variations in the estimates of days lost through illness. Whatever figure is accepted, for us the question still remains; What services shall we have to provide during those days in hospital or for the minor illnesses in the home? And we have not got the answer. A few years ago British doctors, working under the National Health Insurance plan, applied for a higher rate of pay. One of the first questions asked them was how much work are you doing? The doctors did not know, though the plan had been in operation for twenty-five years. The appeal was thrown out.

I know there are statistics of morbidity. Can they be applied to conditions in Canada? Do

they embrace the varied occupations and nationalities in the different provinces? Do they cover the services which modern medicine now considers necessary, and which Canadians expect? I think you will find that they provide little useful information. We may know how many days an employed person loses per annum, but that does not tell us what types of medical services were required during those periods of illness.

There are a great many medical schemes in operation on this continent; mostly they are for selected groups. We are told how much is collected, how much is paid out for administration and to the doctors. The latter are paid on varying percentages of fee schedules which differ widely in provinces and states; if you try to discover what the services actually include you find a paucity of information. I agree that the marshalling of this information is a tedious and expensive process, but unless we are prepared to expend time and money in ensuring equitable treatment in the future we may have to work under conditions anything but satisfactory. We are paying the price of lack of preparedness in international affairs just now, yet many doctors do not realize the unrest of the public in health matters, and feel that if nothing is done this unrest will die down and things will be as they were.

Manitoba has been very lucky either in the fact that she saw the opportunities of obtaining valuable information or created those opportunities. I am going to show you the statistical records of different groups receiving medical care, but at the end of it I shall not be able to tell you what comprises an adequate medical service for a province or a nation. I think I can convince you that we shall have to be very much on our guard against those people who reason from the particular to the general. If Manitoban conditions exist in the rest of Canada, and I have no reason to suppose that they do not, then the national organization should get representative groups to obtain details.

\* Read at the Seventy-second Annual Meeting of the Canadian Medical Association, Winnipeg, June 26, 1941.

I shall present the findings in three groups. First, a depressed group on relief in the City of Winnipeg with an average population of 26,000 over a period of six years. Second, a rural group, this through the courtesy of the Department of Health and Public Welfare, and the assistance of Dr. Jackson, Deputy Minister of that Department. The average population was 15,000 scattered through several municipal doctor areas and nationalities; this for a two-years' period. The third report covers a select group of wage earners, has been conducted for one year, and contains the relatively small number of 550, employees and dependents; the implications of the small number are obvious.

These plans are alike in many respects; they cover all ages and both sexes; all needed services were provided or available on demand; services were provided by specialists and general practitioners. There were no financial relations between doctor and patient except to a limited degree in the rural group. In the relief group any treatment could be given, provided the medical director or the medical advisory board were satisfied that it would benefit the patient. The rural group received such attention as the municipal doctor was liable for under his contract; so far as possible all treatments given in hospitals or outside the municipal areas have been traced and recorded. In the firefighters' group there were no restrictions of any kind except that the attending physician could be asked to justify treatment which might appear to be excessive or unnecessary. Application of this rule was infrequent.

In this latter scheme we introduced a method which is, I believe, a novelty, and will be continued. We accept the principle that specialists are entitled to a higher fee, but how decide who was a specialist? In making application the doctor had to state whether he wished to work as specialist or general practitioner. If the former, he was not permitted to go outside his specialty; if he did, all his work past and future for the year would be paid for on the general

practitioner basis. In such services as can be rendered by general practitioner and specialist, the latter gets 33 per cent more. For instance, a general practitioner receives \$100.00 for an appendectomy, the pure surgeon \$133.00. For removal of tonsils and adenoids the general practitioner gets \$20.00, the specialist \$27.00. For removal of wax from the ear \$2.00 for the general practitioner, \$2.66 for the specialist. Fees, except in radiology done by a general practitioner, cannot be lower than our Workmen's Compensation Board scale, which is regarded as equitable.

TABLE II.

ALL SERVICES PER HEAD PER ANNUM

	Rural percentage	F.F.M.S. percentage
Specialists .....	47	46
F.F.M.S. dependents (64 per cent of beneficiaries) .....		65
Major surgery .....		38

Having seen the figures you will ask why there should be such wide discrepancies. Even the controlled service in the home or office for relief cases is much higher than that in rural areas. Proximity is an influence but not the answer. Undoubtedly if you have to travel ten-to-twenty miles to have your sinuses syringed, take a lamp treatment, or have a dressing changed, bad weather and roads or domestic responsibilities will discourage you unless your distress is severe. In a city the size of Winnipeg, with a medical school, large out-patient departments, and easy admittance to the wards, things are different. Many members of the depressed group had been regular attendants at out-patient departments before going on relief. Every ailment no matter how trivial is the subject of a careful examination, and an obscure or possibly severe illness receives the attention of specialists, interesting x-ray and other tests, all at no cost. It is little wonder that a depressed group, even when on the relief medical system its members are transferred to private practitioners, has become accustomed to an amount of attention which the country dwellers never receive. Having been educated to that kind of service this group will continue to demand a relatively high grade of benefits which can only be checked by strict supervision. We must also remember that country patients have in many cases to pay for major surgery, x-ray and treatment by specialists.

When we study the firefighters' record other factors have to be noted. This service was not entirely based on a buying and selling of medical care; it was an experiment in social welfare. Therefore, if an individual had a disability which might be benefited by treatment, the fact that it had existed for years was no bar. For instance a girl in her 'teens had a bad squint; if uncorrected it would always be a handicap, especially if she sought employment; a satisfactory operation was done. Operations were

TABLE I.

## UTILIZATION OF MEDICAL SERVICES

City based on an average population of 26,104 for 6 years.

Rural based on an average population of 15,058 for 2 years.

Firefighters Medical Services based on an average membership of 546 for 1 year.

Rates are per thousand per annum

	Relief	Rural	F.F.M.S.
Office consultations .....	871	744	1,675
House visits .....	642	263	634
Hospital visits (major and minor operations not included)	336	60	445
Major operations .....	22.7	7.8	55
Minor operations .....	41	..	50
Tonsils and adenoids .....	22	4.7	18
Fractures .....	6	11.4	7
Maternity, term and abortions	27	19.7	14
Refractions .....	16	2.8	78
X-ray .....	7	15.6	36
Illnesses .....	925	585	936



done for hernias, and for gynaecological conditions; probably financial circumstances were responsible for previous delay in treatment. Further, if you find yourself in a position of being able to get medical care without cost, for a pay-roll deduction never reaches your pocket, you are going to take advantage of it. The cost was high, but I think that one would have this experience in every group during the first period; we are in hopes that the second and later years will give a truer picture of necessary services for an employed group.

One of the most important reasons why we must do a large amount of spade work is that actuaries and statisticians will have a considerable voice in the setting up of any health insurance scheme. It would be unreasonable to ask them to give their views with no facts on which to base them. How would you as doctors make a diagnosis and carry out treatment if there were no history obtainable, and the patient was deaf and dumb? Life and fire insurance rates are based on statistical evidence obtained over a number of years and in many different areas. There are many medical schemes on this continent which could provide a wealth of information, but have not, so far as I know. The question of dollars occupies too prominent a position. What shall I get for such an operation or treatment? is the question frequently asked. Whereas, increased volume and services per thousand are the important factors.

We are frequently told that post-war national and social economy will be different from anything we have known before. We hear about the treatment our profession has received in the totalitarian states. We can, if we are prepared, join the new economy without sacrificing the dignity and ideals which have been ours during the centuries.

### MUNICIPAL MEDICAL SERVICES IN SASKATCHEWAN\*

By R. O. DAVISON

*Deputy Minister of Public Health,  
Regina*

Almost seven out of every ten people in Saskatchewan live on farms. The average size of a farm is about 320 acres. In the past this wide distribution of population meant that many rural areas found it extremely difficult, if not almost impossible, to secure any kind of medical care. Too often such areas offered insufficient inducement to attract a medical practitioner. Early experience indicated that municipal assistance was the most effective remedy, and consequently in 1916 rural municipalities were empowered to guarantee a doctor's income up

to an annual amount of \$1,500.00, or to pay him an annual or other grant up to the same amount. Many rural municipalities still make use of this provision.

A rural municipality is an organized rural unit, usually eighteen miles square and containing on an average a population of about 2,100. Its affairs are administered by an elected council with powers similar to those vested in the council of the village, town or city.

In many cases a grant was inadequate to secure a medical practitioner and in 1919 rural municipalities were given wider powers and permission to employ municipal physicians. Legislation set the maximum annual salary at \$5,000.00. In 1930 this was increased by an additional sum of \$500.00 for each township in excess of nine. By 1932 the scheme was applicable to a portion as well as to a whole municipality and also to two or more contiguous units. It was extended to towns and villages in 1935, the maximum annual salary not to exceed an amount equal to \$2.00 per head of population. Rural municipalities as well as towns and villages were permitted to meet their major surgical needs on a similar basis in 1937 with no restrictions on the maximum salary.

Any scheme established so far was to be paid for from funds secured from taxation on land, but in 1939 the Municipal Medical and Hospital Services Act provided an alternate method with the expense defrayed from funds secured by a personal tax levied on each individual resident of the rural municipality, village or town.

Under the municipal acts a physician or surgeon was engaged hitherto on a salary basis, but an amendment at the recent session of the Legislature now permits payment on a fee for service basis.

#### NUMBER OF MUNICIPAL MEDICAL SCHEMES

At present 97 out of the 302 rural municipalities in the province as well as 64 towns and villages provide their residents with municipal medical services. These communities have an aggregate population of 202,774, or 21.2 per cent of our total population of 957,000. If the population of cities is subtracted the percentage is materially increased. Ten of the 97 rural municipalities only employ physicians for a portion of the municipality; seven rural municipalities and ten towns and villages furnish the services from funds secured by a personal tax.

In addition to general medical and surgical services, 33 rural municipalities and 19 towns and villages provide major surgical services.

All by-laws submitted to the voters on the question of municipal medical services as well as any agreements entered into between the municipality and the physician or surgeon, are subject to the approval of the Health Services Board, a branch of the Department of Public Health. This board at present consists of three members; one is a practising physician nomi-

\* Read at the Seventy-second Annual Meeting of the Canadian Medical Association, Winnipeg, June 26, 1941.



nated by the Saskatchewan College of Physicians and Surgeons; the interests of municipalities are looked after by a member nominated by the Saskatchewan Association of Rural Municipalities; the Deputy Minister of Public Health is the third member and acts as chairman.

#### MODEL MUNICIPAL PHYSICIAN AGREEMENT

While the board has been invested with rather wide powers with respect to the supervision of health services as well as the matter of collecting data and information generally on the needs of the people, its main activities so far have been largely confined to securing uniformity in medical and hospital services provided under municipal sponsorship. At the present time the staff is compiling data on incidence of illness and services rendered by physicians from reports of doctors under the relief medical services of the past few years. In one year these relief medical services covered over 250 of the 302 rural municipalities of the province, affecting approximately 400,000 persons.

Municipalities have been urged to adopt the Board's recommendations on the agreement with the doctor. This particular agreement requires the physician to furnish all residents with general medical services, obstetrical care, and minor surgery. In a rural municipality where the number of people warrants it the doctor is asked to give his whole time and attention to the service of the municipality and not to practise his profession outside of the area, except in some case of emergency, and then only until the patient can be turned over to the care of another physician. The contract, however, enables him to practise in a town or village situated within the boundaries of the rural municipality, as long as such practice does not interfere with his responsibilities to the municipality. He assumes all obligations and performs the duty of a medical health officer. He furnishes patients with ordinary drugs, medicines, and dressings on his first visit for temporary relief. Patients pay for subsequent supplies.

Preventive services are stressed. The doctor agrees to systematically organize, establish, and conduct immunization clinics for pre-school, school-age children, and others who request protection. He also agrees to physically inspect all school children at least once in each school year and to examine thoroughly children who appear subnormal.

On its part the municipality provides the physician with a telephone and pays rental and service charges. Three weeks' holidays are granted on the understanding that the doctor furnishes at his expense an acceptable substitute. Leave is also granted to attend local district medical society meetings and the annual meeting of the Saskatchewan Medical Association without deduction of salary. In alternate years of employment two weeks are allowed to attend a refresher course, provided he supplies and pays a substitute.

The patient assumes responsibility for the payment of another physician, should the serious nature of the case require this or should the patient request a consultation with another doctor. The municipality undertakes the expense of another physician where, due to illness or attendance upon another municipal patient, the municipal physician is not available. The liability of the municipality for a substitute doctor in case of illness is limited to three weeks in any one year. Patients are urged to come to the office for consultation and examination by actually stating that requirement in the contract. However, it is the duty of the doctor to attend patients in their homes or a hospital when such attendance is essential in the patient's interest.

The agreement also endeavours to regulate the doctor's practice by requiring patients to call during the daytime, preferably in the morning, although he must attend emergency cases, maternity cases or patients who are critically ill at any time. He is free of professional duties on Sundays and legal holidays, except for urgent cases.

The municipality agrees to pay a stipulated salary, and with but one exception there is no charge made by the doctor to the patient. This exception is an unnecessary home call, in which case the physician is permitted to collect from the patient a fee of \$2.00 and a reasonable mileage or livery charge.

#### AGREEMENT *re* MAJOR SURGERY

The municipality is required to conclude a separate agreement for major surgical services. Before granting approval, the Board satisfies itself that the surgeon is competent to fulfil its terms. The President of the Council of the College of Physicians and Surgeons is asked for an opinion on the surgeon's qualifications. Full responsibility is then assumed by the Board in refusing or granting approval to the agreement.

#### SALARIES OF MUNICIPAL PHYSICIANS

At present the average salary in a rural municipality amounts to \$3,859.00 per annum. In arriving at this figure a number of agreements are included which require the physician to furnish major surgical services in addition to his other duties. These particular agreements were concluded previous to supervision by the Board. The average figure does not include municipalities where separate agreements have been made for major surgery. In considering whether the amount is commensurate with the services rendered several conditions should be kept in mind. Although the model agreement recommended by the Board contains no charges to patients, it is found that 31 of the 97 rural municipalities have inserted some kind of a charge. These contracts were made prior to the establishment of the Health Services Board.

Three rural municipalities permit the doctor to collect an initial home visit fee of \$1.00; one permits an initial home visit fee of \$1.50; in four the same fee is \$2.00 and in five the amount paid by the patient is \$3.00. Two rurals allow the doctor a \$10.00 initial home visit fee; these municipalities are served by a doctor residing in a neighbouring municipality. Two others require the patient to pay \$1.00 for each home call, while in still another the amount has been increased to \$2.00.

Often a charge is made for attending a maternity case. One agreement has set the fee at \$3.00, six at \$5.00, and two at \$7.00.

Also, the doctor is allowed by one municipality to charge \$2.00 for the reduction of a fracture; in another he is allowed \$3.00, and in three, \$5.00.

The Board has discouraged the practice of allowing fees for any type of minor surgery, especially for the removal of tonsils and adenoids. However, a number of old contracts in force permit this. In three agreements the physician collects a \$5.00 fee for minor surgery, in another a fee of \$8.00 for removal of tonsils and adenoids, and in three a charge of \$10.00. The patient pays mileage charges under a number of agreements. In one rural municipality he pays fifty cents per mile one way. In this particular case the doctor receives an annual salary of \$2,200.00 and furnishes general medical services and whatever surgery he is competent to perform for resident ratepayers and renters only. Patients pay him \$10.00 for major surgery and \$5.00 for minor in addition to the mileage fee of fifty cents per mile one way. Diseases requiring specialists' care or x-ray, electrical treatment, or treatment for venereal disease, alcoholism, drug addiction are not included in his duties. Residents other than ratepayers or renters obtain his services at 60 per cent of the scheduled fee. Resident ratepayers and renters may also call two other physicians in the district and their accounts are assumed by the municipal physician. This agreement has been in force for a number of years and, of course, has not been approved by the Health Services Board.

Another scheme allows the physician a mileage charge of 15c per mile within a radius of ten miles of his office and thereafter 12½c per mile. Two municipalities have a 10c per mile summer rate and a winter rate of 20c. Still another employs similar rates, but for medical health officer duties pays the doctor 25c per mile during summer months and 50c per mile during winter months. A further variation discourages driving expenses of the doctor by imposing a fee of 25c per mile for the initial home visit with subsequent visits at 10 and 20 cents.

The model agreement requires the physician to furnish patients with ordinary drugs and dressings on his first visit for temporary relief, but 29 out of the 97 schemes do not require this of the doctor.

#### WORK DONE BY MUNICIPAL PHYSICIANS

Three examples may be cited to indicate the work done by a municipal physician. The first rural municipality with a population of 3,026 employs one physician at an annual salary of \$4,000.00, but the doctor only looks after resident ratepayers. He provides general medical services, minor surgery, and acts as medical health officer, examines school children and conducts immunization clinics. Patients pay for all drugs and dressings. He may collect a sum not exceeding \$75.00 from the patient for major surgical procedures. Last year his work consisted of the following:

Town calls .....	187
Office consultations .....	2,211
Home visits in rural municipality .....	130
Mileage .....	2,573
Hospital visits .....	1,527
Maternity cases .....	58
Major surgery .....	41
Minor surgery .....	332
Surgical cases recommended for treatment elsewhere .....	75
Fractures .....	17
Infectious diseases .....	6
Unnecessary calls .....	2
Deaths .....	13

These services evaluated on the approved schedule of the College of Physicians and Surgeons aggregate \$11,780.00, or approximately three times the salary paid him by the municipality.

The second rural municipality pays its physician \$3,600.00 per annum for general medical services and minor surgery to all of its 2,109 residents. Except for an unnecessary home call fee the patient pays nothing. In 1940 the doctor reported he had 1,898 office calls, 476 hospital visits, a total mileage of 4,141, attended 74 confinements, 61 accident cases, performed 35 surgical procedures, made 20 pre-natal and 15 post-natal examinations, extracted innumerable teeth, attended 35 cases of measles, 3 cases of scarlet fever and 5 cases of chicken-pox; 7 deaths occurred in the municipality during the year.

Two physicians serve a town of 637 population. Each receives \$500.00 for general medical services and \$250.00 for major surgical services, or a total expense of \$1,500.00 to the town. Patients pay \$1.00 for the initial home call; otherwise there are no charges in the agreement. During 1940 the doctors reported 25 surgical cases, 42 medical cases in hospital and attended 10 maternity cases. In addition, they had 600 office consultations and 50 home visits. Their report further showed typhoid inoculations 50; scarlet fever inoculations 25; diphtheria toxoid 25; small-pox vaccine 15. Infectious diseases recorded in the town during the year included chicken-pox 30, whooping-cough 15. There were no cases of measles, scarlet fever, diphtheria or typhoid. Three deaths occurred during the year.



## GENERAL OBSERVATIONS

While originally designed to assist outlying districts in obtaining a resident medical practitioner, the municipal physician system has also been applied to more populous areas where the number of private practitioners was ample. In fact, residents of some municipalities have the choice of several doctors, and salaries are paid in proportion to the number of residents served by each. Thus, the scheme is often established to distribute the cost of medical care over the residents of a municipality.

The system provides incomes to doctors in communities unable to secure adequate medical services by other means. It reduces the expense to the individual, especially to the person living remote from the physician's office. It is an ideal system for the practice of preventive medicine, and the patient and the doctor are brought in contact earlier in the course of a disease.

Unquestionably, certain conditions usually associated with private practice are altered and a physician accepting a municipal practice must of necessity be prepared for them. His conception of a medical practice is entirely changed. He is engaged on a fixed salary basis and must render services regardless of their value under a fee system. He is not at liberty to select or

reject his patients. A large measure of his success depends on his ability to retain the good will and confidence of the municipal council and of the people he serves.

The method of obtaining a municipal contract has in the past proved unfair in a number of cases, resulting in hardship to a doctor who had given good service to the district. Since the Board took over supervision it has endeavoured to have municipalities use medical practitioners already established in the district. For a time municipalities were required to submit a ballot to the voters on their choice of physician to be engaged, but this was found unsatisfactory, mainly from the viewpoint of the doctor, and the practice was discontinued.

Amendments to legislation this year now permit municipalities to provide medical services on a fee for service basis. The municipality intending to introduce such a system must submit a by-law to that effect to the Health Services Board for its approval. The amendments will enable districts in the neighbourhood of the larger cities to introduce a more satisfactory service to residents, in that choice of doctors will be possible.

The success or failure of this method of payment will be watched with interest.

## Special Article

## THE CONFIDENTIAL NATURE OF MEDICAL RECORDS\*

By C. J. TIDMARSH, M.A., M.D., C.M.,  
F.R.C.P.(C)

*Montreal*

The practice of medicine, like every other activity in our modern life, has become more and more complicated as the years of this 20th century pass by.

As a result of this sudden expansion two points are of special interest for the purpose of this discussion; first the demand for lengthy detailed case records, and second the marked changes in the physician-patient relationship.

Records play an important part in scientific medicine. Students, early in their training, are taught how to write a full detailed history, and how to record positive and negative findings for every system in the body. Hospital interns are required to do the same for every patient, and this, together with innumerable sheets of laboratory findings, consultation reports, charts and notes, eventually becomes the case record and reaches the hospital record room for indexing and filing. When properly done, no one can doubt the great value of these records for

reference in future illnesses and for clinical investigation; when not properly done they are practically valueless. In my experience the system is most apt to fail in the special services. A surgical intern, for instance, intent on the local condition, may not think it necessary to record the blood pressure of an apparently healthy young chap with a broken ankle, and a "sink test" may be done on the urine. When this patient returns a year or two later with signs of circulatory failure, hypertension and albuminuria, the previous case report is eagerly consulted, and its lack of information seriously hinders an accurate appraisal of the present illness. In some institutions and clinics this difficulty has been overcome by admitting all patients to a receiving ward where a complete history and general examination is recorded before allocation to any particular service. The system has much to commend it, apart from the complete case history. It is amazing how many unsuspected diseases, often in their early and curable stages, are picked up in this way. The value of the record for clinical investigation and scientific statistics depends on the conscientious effort and accuracy of its writer. For this reason the record needs careful checking by the physician responsible for the patient, and he should invariably be required to sign the finished case report indicating that the history, findings, and diagnosis are correct. In *all* hospitals classified

\* An Address given before the McGill Reporting Society, Montreal, March 3, 1941.



as Grade A case records are an absolute requirement for this standard.

An important point often overlooked is the fact that the medical record of a patient is an integral part of the confidential relationship between patient and physician. Yet one may wander through most any hospital today and see these records lying around on desks or tables, where the prying eyes of visitors, orderlies, or other non-professional people may read them at will. It is surprising that more trouble does not arise from this negligence. In some places unscrupulous lawyers and agents make good livings by obtaining such information and then advising patients to take legal action. When the patient has been discharged the hospital is still responsible for maintaining the confidential nature of the case record. Information from the record should never be disclosed to any other than the referring physician without the written signed consent of the patient or the specific order of the judge in court. This necessary protection of the patient by hospital authorities has caused considerable criticism and misunderstanding, particularly since in recent years the regulations have been more strictly enforced. More strict enforcement has become necessary owing to the many and complicated changes in the patient-physician relationship, which, as stated above, is the second point of interest arising from the rapid expansion of modern medicine, and will now be discussed.

The information confided by a patient to his physician for the purpose of enabling the latter to diagnose and treat his complaint is a privileged communication. This is not part of our common law, but is laid down in the statutes of practically all civilized states. These statutes specify the confidential nature of the privileged communication, and, as is the legal custom, they are interpreted and extended by case law, *i.e.*, judgments handed down in specific cases. Thus, owing to changes in medical practice, a privileged communication now includes information gained by consultants called in by the attending physician, by nurses he puts in charge, by radiologists and others employed to aid in diagnosis or treatment.

Communications made by free patients in hospitals are privileged, and so likewise are communications made to staff physicians and other physicians employed by hospitals as well as medical superintendents in the course of professional attendance. But information given the medical examiner of an insurance company, to a physician when no professional relationship exists, to nurses, public health or otherwise, not acting as agent or assistant to the physician, is not privileged. Usually this statutory privilege is limited to civil cases and does not affect criminal procedure. Hospital records are privileged, but information such as dates of admission, operation and discharge, is not privileged. A written report to a pa-

tient's bona fide attorney is privileged. It is important to note that the privilege survives the death of the patient and this applies to records as well as to the physician's testimony. It is the definite right of the patient or his statutory representative to waive this privilege and to obtain access to all information gained during examination and treatment. Thus a Supreme Court Justice in New York recently rebuked severely certain hospital authorities for refusing a patient's demand to inspect her hospital records without the approval of her physician, the defendant of the action.

It seems to me self-evident that more knowledge of the legal aspects of the physician-patient relationship should be in possession of the medical profession and of the public generally, and that when necessary we should warn and advise our patients regarding its implications, for their protection as well as our own. It is also self-evident that both in hospitals and in private practice the medical case-history of the patient must be protected. The signed consent of the patient is required before any medical information may be disclosed to anyone.

To confuse further the already complicated physician-patient relationship and its associated confidential medical records another factor has within recent years become of great importance. I refer to the development of industrial medicine. We are concerned here with only one small but very important point in this great development—its bearing on the confidential nature of the physician-patient relationship. The industrial physician or surgeon is a paid employee of the company for full or part time services and the workmen receive free medical advice. Now, what happens when the president or the personnel manager wants to know what is the matter with John Doe, whom the company doctor has found to be suffering from tertiary syphilis? By way of illustration I will tell you what actually happened in one company. The doctor respected his patient's confidence and did not divulge the diagnosis, the patient having refused to grant permission to do so. Several years later the patient was transferred to the head office of the company, in another city, and in due course his medical record was sent to the company doctor there. This physician immediately gave the diagnosis to the president, and within twenty-four hours, the local doctor was dismissed from the company's service. He was informed that as a paid servant his loyalty to the company should have made him give the diagnosis immediately. When the question of medical ethics was raised, the answer was brief and to the point—"Business efficiency is not interested in medical ethics". The head office doctor, in expressing his regrets, stated that it was his invariable rule to give the company all such information because it paid for it! This

example is an isolated case and is probably not at all typical, but the fact that it could and did occur proves the necessity for a more definite understanding between industrial doctors and their company officials. The courts have already decided that the relationship between a workman and the company doctor is privileged and confidential. Medical information may therefore not be divulged by a company doctor without the patient's consent. Should he do so, the patient would be entitled to sue the doctor for any damages incurred through loss of employment or in other ways.

Now, what happens when a company refers its employees directly to a hospital? Company officials constantly write or telephone the hospital—what is the matter with our John Doe, how long will he be in hospital, and when can he return to work? The first question cannot be answered without a breach of privilege, the latter two *can* be answered. Some companies may threaten to cancel their contract unless full information is given. Well, it cannot be helped. No hospital could accept a contract which implied the disclosure of confidential information. The government frequently demands medical information concerning military pensions, but is not entitled to it without consent, unless special regulations have been passed.

This discussion has directed your attention to the confidential nature of medical records and of the physician-patient relationship. It is said that it is better to be born lucky than rich, and this is probably the reason that many doctors and hospitals have escaped heavy damages. Let us be wise before the event.

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## Divisions of the Association

### Nova Scotia

Despite war and bad weather the annual meeting of the Nova Scotia Medical Society, held at Kentville in early July, was a successful affair. The eighty-four members present were given ample opportunity to expound on medical matters politic, but only the ever topical *health insurance* had appeal enough to rouse much comment. Even here, guided by the succinct views of the Canadian Medical Association President G. S. Fahrni, the Society was surprisingly acquiescent to leaving the solution with the senior Association.

Scientifically, the standards of the program were high. Dr. Fahrni's talk on "Parathyroid tumours and hyperparathyroidism". "Functional disorders of the colon", as presented by Dr. J. H. Geddes, and Dr. R. R. Fitzgerald's "Three troublesome fractures" were all eagerly received. Scarcely less enthusiasm was accorded to the papers of the local men: "Some interesting facts from our recent epidemics", by Dr. A. R. Morton, Halifax; "Surgery and the heart",

by Dr. T. A. Lebbetter, Yarmouth; "Pitfalls in the diagnosis of tuberculosis", by Dr. A. F. Miller, Kentville; "Some chronic suppurative conditions of the lungs", by Dr. V. D. Schaffner, Kentville; and "The significance of hæmoptysis", by Dr. J. E. Hiltz, Kentville.

Golfers trudged through mud and over wet greens in competition with trophy winner Dr. L. M. Morton. Those of more conservative disposition supped tea at Dr. Miller's and, later danced at Dr. Cox's. At the banquet, addresses by Dr. Fahrni and President A. B. Campbell made stimulating thought-food, serving to complete a well balanced, two day mental repast.

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## Post-Graduate Courses

### Post-graduate Course on Fractures

The University of Toronto offers to graduates in Medicine a course of one week on Fractures, commencing Monday, September 29, 1941, at 10 a.m. This course will continue morning and afternoon until Saturday noon, October 4th. It will be made as practical as possible, and an attempt will be made to have the students take part in all demonstrations.

The course will be limited to 25.

Full particulars will be sent on application to the Secretary, Faculty of Medicine, University of Toronto, at whose office registration will take place.

A fee of \$25.00 will be charged. Cheques should be made payable to the Bursar, University of Toronto.

In making application please state (a) date of graduation; (b) what school; (c) training since graduation.

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## Letters, Notes and Queries

### The Problem of Distribution of Health Services in Canada

#### To the Editor:

An interesting analysis of the report of the National Committee for Mental Hygiene (Division on Public Health and Medical Services) entitled "Study of the Distribution of Medical Care and Public Health Services in Canada" has been written by the distinguished journalist, R. S. Lambert, under the title "How Healthy is Canada?" It is worthy of being carefully studied by every physician in Canada.

The following points are emphasized in Mr. Lambert's analysis.

1. There is a general shortage of doctors, nurses, and dentists in the Dominion. Accord-

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Answers to letters appearing in this column should be sent to the Editor, 3640 University Street, Montreal.



ing to the standard set by the United States Committee on the Costs of Medical Care, there should be one doctor for every 700 to 750 people. Canada does not measure up to this standard. She has, on the average, one doctor for every 1,034 inhabitants, and one dentist for every 2,566 persons—a shortage of 4,679 doctors and 6,323 dentists.

2. A highly uneven distribution of medical services exists in Canada. For example, 28 per cent of the population of the Dominion (in cities of 30,000 or over) are served by 45 per cent of the doctors, 48 per cent of the nurses, and 49 per cent of the dentists.

3. There is much too high maternal mortality in Canada. As late as 1936, out of 26 leading countries, Canada had the fifth highest loss of mothers.

4. Canada's infantile mortality rate is the highest among all the white peoples of the British Empire.

5. Public health expenditure in Canada is much too low. Out of 193 millions of dollars spent on health services in the Dominion, only 12 millions (or 6 per cent) were spent on public health and sanitation. These are plain facts and must be faced sooner or later, by all of us.

For what they may be worth this writer suggests the following two propositions in the belief that either one constitutes an approach, at least, to a cure of the ills of Canada's health system.

Scheme (A) consists of a system of socialized medicine for Canada under Federal control. This would include a planned distribution of doctors, nurses and dentists; a systematic bringing up of the number of health workers to the standard suggested by the American Medical Association and remuneration on a salary basis. Such a planned medical service would, undoubtedly, be the quickest and surest way of providing accessible and adequate medical care for every man, woman and child in Canada.

Scheme (B) is really a broadening and extension of the present health system and recommends the following. (1) To offset the general shortage of doctors, the doors of Canada could be opened to admit refugee physicians in sufficient numbers to bring the standard up to modern requirements, *i.e.*, one doctor for every 750 people or every 800 at least. It would be a wise and far-seeing policy for Canada to follow, whether looked at from the standpoint of health, or national economy, or even from the point of view of international relations. (2) To correct the uneven distribution of health services between outlying districts and urban areas the Government should be asked to subsidize a sufficient number of young doctors, nurses and dentists as would be needed to secure adequate medical care to people in isolated and sparsely populated places. The grant should be sufficiently generous to allow young physicians and other health workers to marry and live in reasonable comfort. In addition, a State post-

graduate fund might be set aside to allow the above doctors, nurses and dentists to return at suitable intervals to the larger centres for a post-graduate course to bring their medical knowledge up to date. The Government grants should be extended also to doctors, nurses and dentists serving low-income areas in large cities.

A nation's greatest asset is the health, happiness, and security of its people. These should be, therefore, the first concern of any Government. So, then, let us do something about it and not be satisfied until the benefits of modern, scientific medicine are available for every man, woman and child in Canada. Which is no more than their birthright!

Lastly, even when looked upon from the point of view of Canada's war effort, the improving of the national health would without doubt constitute one of the greatest, if least spectacular, aids to Canada and the Empire.

HILDA R. B. WERDEN, M.D.

St. Catharines, Ont.,  
July 4, 1941.

## Abstracts from Current Literature

### Medicine

**Observations on the Effect of Streptococcal upper Respiratory Infections on Rheumatic Children: A Three-year Study.** Kuttner, A. G. and Krumwiede, E.: *J. Clin. Investigation*, 1941, 20: 273.

The authors describe the effect of three outbreaks of streptococcal upper respiratory infections during three successive winters in a colony of rheumatic children. Each of these outbreaks was due to infection with a single type of Group A beta-haemolytic streptococcus, but during each epidemic a different type was prevalent.

The incidence of rheumatic recurrences following these streptococcal upper respiratory infections varied greatly—from none to a large proportion of cases.

A comparison of the epidemic strains failed to reveal any significant differences which might account for the variations in the incidence of rheumatic recurrences. A comparison of the rheumatic histories of children who escaped and of those who developed rheumatic recurrences following pharyngitis due to "effective" strains of streptococci likewise did not show any striking differences. Their findings suggest that the vulnerability of the rheumatic subject to the effect of streptococcal upper respiratory infections is variable and depends on factors which at the present time are not understood.

No rheumatic recurrences were observed in children who escaped streptococcal upper respiratory infections during the three-year period.

S. R. TOWNSEND



**Heberden's Nodes: Heredity in Hypertrophic Arthritis of the Finger Joints.** Stecher, R. M.: *Am. J. M. Sc.*, 1941, 201: 801.

Heberden's node or hypertrophic arthritis of the finger joints is a distinct clinical entity. Two types may be recognized, one arising from trauma, the other idiopathic. The disease is profoundly influenced by race, sex and age. In the study of 68 families of patients with this condition it was found that the mothers of the patients were similarly affected twice as often as women in the general population; and that sisters of the patients were affected three times as often as women in general. These figures may err on the side of underestimating the influence of heredity rather than of overestimating it. A control study of 43 families without this disease showed that the sisters in these families had the same incidence of arthritis of the finger joints as had the population in general. The condition occurs too frequently in more than one member of the family to be accounted for on the basis of chance. The exact mode of transmission of the hereditary factor involved is not yet determined.

Three generations of affected females were found in four of the families; and in several families the line of descent was from the paternal side, although the father was not necessarily affected. Three pedigrees are given; in the first, a mother and four of her five daughters were affected; the four sons were normal. In the second, seven sisters of eight were affected; the two brothers were normal. In the third, a paternal aunt, four of five sisters and the only brother were affected. The probabilities that these were chance distribution were calculated and found to be very small; leaving the obvious conclusion that the disease has an inherited basis.

MADGE THURLOW MACKLIN

### Surgery

**A Comparison of the Effects of Heat and those of Cold in the Prevention and Treatment of Shock.** Blalock, A. and Mason, M. F.: *Arch. Surg.*, 1941, 42: 1054.

In recent years there has been a revival of interest in the reactions of living matter to changes of temperature. Because of the variability in individual responses to various means of producing shock, such as trauma and the removal of blood, it is extremely difficult to compare the effects of various therapeutic agents. Hence rather extreme alterations of temperature, both above and below the normal level, have been brought about in order that the differences in effects might be more clearly discernible. In many of the authors' experiments the alterations in body temperature were so great that no conclusions regarding the treatment of shock in man can be drawn. They believe that the results portray fairly accurately the effects of marked degrees of heat and cold on animals in incipient or fully developed shock.

Significant elevations of temperature decrease the chance of life and shorten the period of survival. The application of cold does not increase the chance of survival but is accompanied with a lengthening of the survival of an animal with a low blood pressure. Significant elevations of temperature cause more disastrous effects than do depressions of similar degree. The authors emphasize the fact that their paper does not offer evidence to the effect that the time-honoured custom of warming the patient in shock is a bad one. Neither is it proved (or believed, for that matter) that measures to reduce below normal the body temperature of patients in shock should be instituted. They believe that the augmentation of the reduced blood volume by the intravenous introduction of whole blood or plasma is much more important than supplying heat artificially.

G. E. LEARMONTH

**Reduced Temperatures in Surgery: I Surgery of Limbs.** Allen, F. M.: *Am. J. Surg.*, 1941, 52: 225.

The results of experimental and clinical observation show that the survival of tissues deprived of all blood supply depends greatly on the modification of local metabolism by temperature. If low temperatures are maintained an attached limb can be restored to usefulness after many hours with a tourniquet in place. The blood does not clot, the vessels remain intact, nerve injuries are minimized and shock is abolished by near-freezing. If the gangrenous limb of a diabetic is surrounded by ice bags it is found that a tourniquet may be safely applied without discomfort. After a time anaesthesia is complete and the surgeon is able to work in a bloodless and shockless field in a leisurely fashion. The technique of such an operation is described, as is the remarkably smooth post-operative course and wound-healing. After-shock is obviated. Refrigeration enables the trial of conservative measures for longer periods.

The abuse of heat in arteriosclerotic and diabetic gangrene is discussed. The attempt to bring about hyperaemia by heat results in raising local tissue metabolism and creates a need for a greater blood supply than is possible through rigid arteries. But it has been found that pain or discomfort brought on by cold contraindicates its use. Reduced temperatures are tolerated well for long periods by many types of cases and the progress of gangrene delayed. Refrigeration offers an alternative when high amputation is risky in desperate cases, for tourniquets may be used and shock avoided. It is suggested that artificial heat and unduly warm dressings may delay healing and allow infections in low amputations for diabetic gangrene. The practice of amputating through muscle masses leads to shock and poor healing. Fascia and tendons have low vitality and survive with less circulation.

The possible value of these considerations in war surgery is pointed out. The use of low temperature enables tourniquets, painless transportation, and operation without additional anaesthesia and without shock. Infection is held in abeyance and the ultimate result should be preservation of tissue. Embolism is one condition where heat is disastrous. Refrigeration will prevent post-operative necrosis and thrombosis.

BURNS PLEWES

**Treatment of Fractures of the Neck of the Femur by Internal Fixation.** *J. Bone & Joint Surg.*, 1941, 23: 386.

This is a report of the Fracture Committee of the American Academy of Orthopaedic Surgeons. The Committee has been selected for their knowledge of the methods of internal fixation by the Smith-Petersen nails and the multiple pins such as in Moore's technique.

The criteria for inclusion of cases in this series are rigid and require that the fracture be a recent, subcapital fracture with displacement of the fragments, that full records and x-rays be available, and bony union and other changes are judged on x-ray films. By these criteria only 241 out of 1,485 cases were suitable for analysis, but it is obvious that by such selection some data of absolute value could be deduced. Further, a minimum of one year follow-up was decided upon.

Of the 241 cases, 59.8 per cent had Smith-Petersen nails; 34.4 per cent multiple wires. Solid bony union occurred in 70.1 and 72.9 per cent in Smith-Petersen nails, 62 per cent with multiple wires. The incidence of degenerative changes in the femoral head was approximately equal. The relationship of bony union to anatomical reduction bears a direct ratio, and anatomical reduction, a reduction in slight valgus, is regarded as ideal. The mortality was 11.6 per cent in 923 cases, studied from this point of view.

The failure to maintain reduction, the tendency to extrusion and intrusion of the fixation agents were much greater with multiple wires than with the Smith-Petersen nails. This is a most valuable analysis of this particular subject, and shows that the Smith-Petersen nails as presently used give the best chance of bony union with the fewest complications.

H. F. MOSELEY

**Prevention of Wound Disruption with Through-and-through Silver Wire Stay Sutures.** Holman, C. W. and Eckel, J. H.: *Surg., Gyn. & Obst.*, 1941, 72: 1052.

Les auteurs exposent les avantages et la technique d'une suture totale pratiquée au fil d'argent, sans toutefois en décréter l'emploi d'une manière définitive et absolue. Ils considèrent la suture totale au fil d'argent comme idéale pour tous les patients dont le tractus gastro-intestinal a été ouvert, pour ceux qui

souffrent d'une infection abdominale aiguë, les malades âgés ou faibles pour lesquels le lever précoce présente quelque avantage, enfin pour tous ceux dont la guérison des plaies se trouve retardée pour une raison ou pour une autre, ce qui peut entraîner la possibilité d'une rupture. Le genre de suture indiqué plus haut éloignera les craintes d'éviscération, d'infection et de hernie post-opératoire en même temps qu'il évitera au patient une blessure douloureuse.

Une fois garanties les précautions d'usage d'aseptic, d'hémostase complète, de soin et de délicatesse dans le maniement des tissus, les auteurs insistent sur plusieurs points de technique lorsqu'on pratique la suture totale complémentaire au fil d'argent. Celle-ci doit être faite par plans successifs, afin d'assurer la parfaite concordance des tissus entre eux. C'est en somme une suture totale en un plan qui renforce la suture plan par plan habituelle. L'opérateur doit prendre soin de ne pas coincer les viscères entre le péritoine et les fils d'argent et de ne pas trop serrer ceux-ci afin de ne pas provoquer d'œdème post-opératoire et d'infection. Il devrait être possible de passer facilement un doigt entre les fils et la peau une fois que la suture est faite.

Certes, ce système de fermeture par plans successifs demande plus de travail à l'opérateur et peut parfois être contre-indiqué lorsque l'état du patient requiert une suture rapide. Mais il n'en demeure pas moins l'idéal et le meilleur préventif contre la rupture des blessures dans la majorité des cas.

PIERRE SMITH

**Obstetrics and Gynecology**

**The Normal Menopause.** McLaren, H. C.: *J. Obst. & Gyn. of the Brit. Emp.*, 1941, 48: 1.

Eighty-four patients were examined. The information obtained from 10 cases was discarded as unreliable. Of the remainder 37, or 50 per cent, had flushing before the menopause, but this was only marked in 7 cases (9.4 per cent). Flushing after the menopause was absent or mild in 65 (83.4 per cent) and severe or moderately severe in 13 cases (16 per cent).

Vaginal investigation showed that (a) the pH of the vagina is usually alkaline in the menopause but with exceptions, e.g., 4 cases were under 4.9 out of a total of 50. (b) Bacteriology—17 (28.3 per cent) had pure or almost pure Döderlein's bacilli; 7 patients were over 70 years of age. (c) Vaginal cell smears—47 (78 per cent) had normal Grade III smears. They occurred in approximately equal proportions in both the old and young age-groups. Cell smears could rarely be correlated with the underlying epithelium and have only a limited use. (d) Histology of mucosa—15 biopsies (65.2 per cent) proved normal; 4 were moderately senile, and 4 showed senility in areas of the biopsy. (e) Glycogen was present in all sections of mucosa examined.



The usual statement that after menopause the genital tract undergoes atrophy and the vaginal mucosa becomes thin, is far from representing the true state of affairs. In fact, histological examination of the vagina demonstrated that in 65 per cent the appearances were normal and this corresponded roughly to the finding of Grade III smears in 78 per cent. In 28 per cent there was a pure growth of Döderlein's bacillus, and in 8 per cent a secretion with a pH of less than 5.

One must conclude, therefore, that in some women very little change in the anatomy or physiology of the vagina takes place after the menopause, except probably some rise in the pH of the vaginal secretion with an influx of mixed organisms. There is great individual variation which does not seem to depend to any marked extent on the age of the patient. These findings afford confirmatory evidence of ovarian activity after the menopause.

P. J. KEARNS

**The Induced Menopause.** McLaren, H. C.: *J. Obst. & Gyn. of the Brit. Emp.*, 1941, 48: 23.

The menopause was induced by radium or surgical method in 214 patients, and these were investigated and compared with a series of 84 normal menopausal women.

The incidence of severe or moderately severe flushing is about three times greater when the menopause is induced by radium or surgical castration than when it occurs spontaneously. Hysterectomy with retention of ovarian tissue is practically never followed by severe flushing, in contrast to the radium menopausal group.

(a) External genitalia.—Atrophic labia were noted in 13 patients (13.0 per cent). (b) Stenosis of the vagina.—Closing of the fornices occurs normally in the menopause and was observed in 77 per cent of the normal series. Following the radium menopause this closure of the upper vagina occurred in 61 patients (67 per cent).

A follow-up of 100 patients in whom the menopause was induced by radium showed that with three exceptions a cure resulted. Forty-four per cent were upset by flushing; of the castrated patients 47 per cent were similarly affected.

Frequently one must choose between induction of the menopause by surgical methods or by radium when either would be suitable. Following a study of the menopausal symptoms and signs after hysterectomy or radium, the author believes that the former should be reserved for certain women in the younger age group. In women under 40 with obvious sexual function, conservation of ovarian tissue at the operation of hysterectomy will cure uterine hæmorrhage without the disadvantages of the menopause. The patient will avoid flushings. The anatomy and physiology of the vagina will remain normal. Libido will probably be undiminished. If it is found necessary to remove both ovaries with the

uterus menopausal symptoms and signs akin to those produced by radium result. In all other cases radium appears to be an excellent method of induction of the menopause.

P. J. KEARNS

#### **Uroselectan B as a Method of Inducing Labour.**

Playfair, P. L.: *J. Obst. & Gyn. of the Brit. Emp.*, 1941, 48: 41.

The dosage generally used for amniography is 20 c.c. of uroselectan B injected into the amniotic cavity, and this was at first employed, but after trying varying doses it was found that 10 c.c. gave the best results and was used for all the cases in the series.

This method has now been tried in 115 patients, 74 of whom were primigravidae and 41 multiparæ, at King's College Hospital and Queen Charlotte's Maternity Hospital. A case was considered a success if regular labour pains started within 76 hours of the injection of uroselectan B. Any case taking longer than this was considered to have failed.

The disadvantages are: firstly, the drug takes a longer time to induce labour than other methods described; secondly, the technique, although a relatively simple one, does need a little practice; thirdly, if uroselectan is injected into the maternal or fetal tissues directly it may cause considerable sloughing; fourthly, before the 20th week of pregnancy it is difficult to be certain that gut is not lying in the track of the needle; fifthly, the method is unsuitable for those cases in which there is a possibility of gut being adherent to the anterior abdominal wall in the region in which the needle is to be introduced; sixthly, the theoretical danger of tearing the umbilical cord or large placental vessels with the end of the needle.

P. J. KEARNS

#### **Observations on the Occurrence of *Clostridium Welchii* in the Vagina of Pregnant Women.**

Sadusk, J. J. F. and Manahan, C. P.: *Am. J. Obst. & Gyn.*, 1941, 41: 856.

In a study of 219 normal prenatal patients, 8.7 per cent were found to have *Cl. welchii* by vaginal culture; 9.1 per cent of the coloured women and 8.1 per cent of the white women had positive cultures. Of the 19 strains of *Cl. welchii* isolated, 9 were "guinea pig"-virulent. *Cl. welchii* was not a permanent inhabitant of the vagina in any of the patients. The number of primiparas yielding positive vaginal cultures would suggest that perineal relaxation is not the main factor in contamination of the vagina by *Cl. welchii* from the faeces.

Puerperal infection was no more frequent in the group with positive vaginal culture than in women with negative vaginal culture. Isolation of the gas bacillus from the vagina in three cases, either during labour or in the puerperium, would demonstrate that the recovery of this organism from the vagina does not necessarily imply infection with the Welch bacillus, since all three patients remained afebrile and pre-

sented no evidence of puerperal infection. The above results would seem to indicate that *Cl. welchii* may be found normally in the vagina of the adult pregnant female, but that it is not necessarily a permanent inhabitant.

Recovery of the gas bacillus from the normal vagina is not necessarily of serious import, but in the presence of traumatized or devitalized tissue serious infection with the gas bacillus may result.

ROSS MITCHELL

### Ophthalmology

**Advances in the Use of Sulfanilamide Compounds in Ophthalmology.** Guyton, J. S. and Woods, A. C.: *Am. J. Ophthalm.*, 1941, 24: 428.

The fundamental principle of chemotherapy is the administration of the drug in dosage sufficient to maintain optimal blood concentration. Judging from reports in the literature, there appears to be a tendency among ophthalmologists to be ultra-conservative with regard to dosage. The table given in the article suggests a dosage adequate to maintain an average blood level of between 6 and 11 mg. per cent in the case of sulfanilamide, slightly less in the case of sulfapyridine, and between 3 and 9 mg. per cent in the case of sulfathiazole.

The drugs of choice at present in the treatment of various ocular infections are (a) for gonococcal conjunctivitis, sulfathiazole, which should be continued for about 3 days; (b) for trachoma, sulfanilamide, a blood concentration of 6 to 11 mg. per cent maintained for 2 to 3 weeks; (c) for beta-hemolytic streptococcus infections sulfanilamide remains the drug of choice, although sulfapyridine and sulfathiazole are equally effective; (d) for staphylococcus infections sulfathiazole is the most effective drug at present available, but even this is not very efficacious; (e) for pneumococcus infections, sulfapyridine and sulfathiazole are about equally effective; (f) for Koch-Weeks' infection sulfapyridine is more effective than sulfanilamide; (g) for meningococcus infections sulfanilamide is effective, although sulfapyridine is probably a little better; (h) for infections due to *B. coli* and other related Gram-negative bacilli sulfathiazole is more effective than either sulfanilamide or sulfapyridine, but at best the therapeutic response is not too good; (i) for infections of unknown etiology, sulfathiazole is at present the drug of choice, because it has the widest range of effectiveness. Prophylactic administration of sulfathiazole is recommended in cases of intraocular injuries.

S. HANFORD MCKEE

**Treatment of Gonorrhoeal Diseases of the Eye with Sulfanilamide: Three Years' Clinical Experience.** Mullen, C. R.: *Arch. Ophthalm.*, 1941, 25: 655.

At the Philadelphia General Hospital, where more than 80 patients with gonorrhoeal infections of the eye have been treated in the last

three years, 42 patients were treated with sulfanilamide both locally and internally. From this clinical experience a standard routine has been evolved for treatment of this disease. The results have brought about a remarkably lessened incidence of corneal complications and a decrease in the duration of the hospitalization. It is believed that if the plan of treatment now pursued is followed rigidly, gonorrhoeal infections of the human eye will be relegated to the category of the less serious ocular diseases.

The treatment followed is the use of sulfanilamide internally in a dose of 1 to 2 grains per pound of body weight, but never more than 100 grains for the first 24 hours of hospitalization, and irrigations of the involved eye with a 2 per cent boric acid solution, followed by the free instillation of an 0.8 per cent solution of sulfanilamide at 10 minute intervals day and night. The local use of this saturated solution is complemented by an adequate amount of internal treatment with the same drug. When sulfanilamide is given to infants the prescribed amount is crushed and placed in water in the feeding bottle; no difficulty in its ingestion and passage through the nipple holes is encountered if the nurse agitates the bottle to keep the undissolved particles in suspension.

After the first 24 hours of treatment the internal dose of the drug is decreased one-quarter to one-half for each pound of body weight, again depending upon the particular case. At this time the ophthalmic surgeons at the Philadelphia General Hospital are encouraged by the results of treatment of gonorrhoeal infection of the eyes by local and internal use of sulfanilamide. After three years of clinical trial and observation the method of treatment has evolved itself into an almost constant series of treatments during the first twenty-four hours. In the second twenty-four hours the treatment is less constant.

S. HANFORD MCKEE

**The Relationship Between Myopia and Avitaminosis.** Laval, J.: *Am. J. Ophthalm.*, 1941, 24: 407.

There is such widespread interest in vitamins and their most intimate relationship with all physiological functions, that miraculous cures are expected from all the vitamins we know. We have had quite a bit of excessive zeal in ophthalmology which reports cures in all sorts of things, but so far the only decisive, definite and incontrovertible evidence of cure with vitamins in ophthalmology has been (1) in the use of vitamin B complex in cases of toxic amblyopia (alcohol, tobacco), and in optic neuritis associated with pellagra; (2) the cure of keratomalacia, xerophthalmia and associated ocular conditions by the use of vitamin A.

The author concludes his article as follows. (1) There is experimental proof that avitaminosis will cause changes in the ocular tissues of experimental animals, primarily in the cornea



and sclera. (2) There is insufficient proof that D avitaminosis will cause changes in the corneal sclera. (3) Excessive dosage of viosterol has caused unhappy results in children, and excessive dosage of viosterol in adults may be carcinogenic in effect. (4) Myopic persons should not constantly wear their correction for myopia for distance vision unless vision without the glasses is so poor that the wearing of glasses is absolutely necessary. But the myopic must wear their correction for close work always.

S. HANFORD MCKEE

### Neurology and Psychiatry

**Antiseptics in Brain Wounds.** Russell, D. S. and Falconer, M. A.: *Brit. J. Surg.*, 1941, 28: 472.

This is an experimental study carried out on rabbits of the histological reaction of cerebral tissues to various antiseptic solutions. The object of the investigation is to ascertain which, if any, of the surgical antiseptics whose germicidal potency is widely accepted can be applied safely to the brain. It is apparent that these solutions must be isotonic and as far as possible buffered to the neutral point. Antiseptics which have been tested include: (1) Acridine compounds, such as acriflavine, euflavine, proflavine and rivanol; (2) coal-tar derivatives such as dettol; (3) halogen compounds, such as choramine-T, azochloranid, and eusol; (4) salts and compounds of heavy metals, such as mercurochrome, metaphen and merthiolate; (5) oxidizing agents, such as hydrogen peroxide.

Proflavine sulphate in 0.1 per cent isotonic solution, buffered to pH 6.2, is not more injurious to the brain than normal saline, and is, on this and more general grounds, the antiseptic to be preferred for the prophylactic treatment of brain wounds; 2:7 diamino-acridine hydrochloride is similar to proflavine in its action and deserves further investigation in view of its low toxicity. Most of the other antiseptic solutions tested were highly destructive. In a footnote the authors add that subsequent investigation has shown that small quantities of sulfanilamide and sulfapyridine in powder form inflict no appreciable damage upon the brain.

FRANK TURNBULL

**Gunshot Wounds of the Head in 1940.** Cairns, H.: *J. Royal Army Med. Corps*, 1941, 76: 12.

Gunshot wounds of the head show some striking differences from the closed head injuries of civil life. The first of these is the frequency with which consciousness is retained at the moment of impact. The usual story is that the patient is knocked over by the impact and then gets to his feet, to continue fighting, or to walk back to the aid post. Thus, 23 of 29 patients did not have the clinical syndrome of concussion. The assessment of delayed unconsciousness may be difficult, and it is important to recognize that extreme fatigue may play a considerable

part in producing it, especially when combined with routine injections of morphine. Another respect in which gunshot wounds differ from closed head injuries is in the frequency with which they are followed by symptoms of a focal character. There is a strong tendency for the focal signs to undergo spontaneous improvement or recovery. In the last war complete excision of the foreign body and its track of damaged brain was advocated. The indications to remove clot and septic material remain valid, but it is clear that in a number of cases of this war infection and massive clot do not develop; the changed conditions of warfare, chemotherapy, and, possibly, a relative decrease in size of high velocity missiles, may contribute to this. Operation cannot cure focal signs, which are the immediate sequel of penetrating wounds. It is only the signs of delayed onset and progressive course, due to clot infection, or ærocele, which may be amenable to surgery. The case for early operation to clean surgically the skin and superficial parts of every head wound, and where possible to do primary suture, remains clear. In scalp wounds the risk of infection spreading through the intact skull and dura is greater after gunshot wounds than after blunt injury. Light dusting of the wound with sulfanilamides before closure is not irritating and is evidently a helpful measure against infection. Scalp wounds can be excised up to 3 days and longer after injury. In the forward area, where no operating facilities are available, it is better to apply a moist flavine pack with firm bandage than to close the scalp imperfectly and without cleaning the depths of the wound.

FRANK TURNBULL

**Head Injuries and Meningitis.** Linell, E. A. and Robinson, W. L.: *J. Neurol. & Psychiat.*, 1941, 4: 23.

Fatal infection of the meninges associated with fracture of the base of the skull may occur at the time of the injury, killing the patient within a few days or weeks of the accident, but its onset may be delayed for years after the head injury. Relationship of the head injury to the meningitis may be obscure until it is revealed at post-mortem. Fracture of the base of the skull in a patient with chronic middle-ear disease is a serious situation. An apparently trivial facial and nasal injury may damage the cribriform plate of the ethmoid sufficiently to provide a pathway for the passage of pneumococcal nasal infection. Seven illustrative cases are reported and in 3 of these the meningitis occurred 14, 5 and 2½ years, respectively, after injury. The pneumococcus was the organism responsible for the meningitis in all 7 cases.

FRANK TURNBULL

**Unilateral Exophthalmos (Proptosis).** Dixon, G. J.: *Brain*, 1941, 64: 73.

A lateral or vertical deviation indicates that the proptosis is due to pressure of some structure invading the orbit from one of its bony

walls or lying in the orbit outside the cone formed by the ocular muscles. Such a structure may be an exostosis or secondary carcinoma of the orbital wall, a localized patch of syphilitic periostitis or the intrusion of a tumour such as mucocele or carcinoma from one of the nasal sinuses. When the proptosis occurs symmetrically forward it is likely due to: (1) a mass within the cone of the orbital muscles, usually a glioma or meningioma of the optic nerve; (2) lymphatic and venous engorgement of the orbit, due either to local inflammation or obstruction of venous drainage by a lesion in the middle fossa; (3) paresis of ocular muscles. If the proptosed eye can be easily reduced into the orbit it is probable that venous obstruction or paresis of ocular muscles is the cause. Generalized impairment of visual acuity in the proptosed eye is usually due to a lesion in the orbit and is usually accompanied by papilloedema. A central scotoma or other defects of visual fields indicate a lesion of the middle fossa. All forms of proptosis are associated with diplopia and paresis of ocular muscles and no very useful deduction can be made from the intensity or distribution of the ocular palsies. A dilated and sluggish or paralyzed pupil, however, strongly suggests a lesion of the middle cranial fossa.

FRANK TURNBULL

### Therapeutics

**Thyroid Therapy in Gastro-intestinal Disturbances.** Moehlig, R. C.: *J. Clin. Endocrinol.*, 1941, 1: 29.

L'extrait thyroïdien s'est montré être si efficace dans certains troubles gastro-intestinaux que l'auteur croit devoir insister et avec raison sur cette action. Il rapporte 32 malades dont les symptômes simulaient l'ulcère peptique, la cholécystite chronique, appendicite chronique, et la colite muqueuse. Soixante-quinze pour cent de ces malades souffraient de céphalée périodique; 59 pour cent présentaient une histoire de migraine familiale; 34 pour cent subirent une appendicectomie sans aucun résultat. Le cholestérol sanguin était élevé chez la plupart, avec un métabolisme basal en moyenne de -15. La plupart de ces malades suivaient un régime soi-disant approprié et une médication gastrique ou intestinale sans aucun résultat; 68.7 pour cent furent complètement guéris par l'extrait thyroïdien, à la dose moyenne de  $\frac{1}{4}$  de grain, trois fois par jour.

L'auteur insiste sur la nécessité de surveiller les signes de toxicité, céphalée, nervosité, tachycardie, insomnie, qui doivent faire discontinuer la médication, et l'auteur conclut en insistant sur la fréquence des troubles digestifs, souvent étiquetés névropaties, qui en réalité relèvent d'une hypo-thyroïdie fruste, et de ce fait justifient une thérapeutique endocrinienne plus que digestive.

YVES CHAPUT

**The Treatment of Chronic Leukæmia by Small Dose Roentgen Ray Technique.** Dowdy, A. H. and Lawrence, J. S.: *J. Am. M. Ass.*, 1941, 116: 2827.

The authors in the past 3 years treated 20 different patients with chronic leukæmia with individual small doses of roentgen rays by the local or quadrant technique, or by a concentration of the two. Of these 9 have died and no trace of one has been found after a period of two years. These ten patients lived an average two and 77/100 years after the onset of the disease. The longest period of survival was five years, and the shortest one year and three months. Life expectancy is not altered by these smaller doses, but in the authors' experience it has resulted in an increased degree of comfort to the patient in comparison with the higher individual doses of roentgen therapy. During the treatment periods the patients were practically free of nausea and vomiting or of a feeling of increased toxicity. After a series of treatments their convalescence seemed more rapid.

S. R. TOWNSEND

**Heparin as a Prophylactic Against Thrombosis.**

Crafoord, C. and Jorpes, E.: *J. Am. M. Ass.*, 1941, 116: 2831.

In 325 cases involving post-operative treatment with heparin symptoms of thrombo-embolic complications did not arise; in a control series of 1,111 similar cases such complications occurred in 9 per cent.

The patients selected were in both series over 35 years of age and submitted to operations on the gastrointestinal tract, the biliary system, or the urinary passages, or to major operations for hernia and varices.

Reference is made to another series of 88 patients with gynecological disorders operated on for myoma or prolapsus uteri without any thrombo-embolic complications; in the control series of 1,054 cases there were complications in 4 per cent.

The heparin used had a strength of about 70 per cent of the pure mucotin trisulphuric acid. It was given as a 5 per cent sterile solution in intermittent intravenous injections four times a day. The ordinary dose was 50 plus 50 plus 50 plus 100, (or 75 plus 75 plus 75 plus 125) mg. daily, started four hours after the operation. The treatment was continued for five to ten days.

S. R. TOWNSEND

### Pathology and Experimental Medicine

**Thrombosis of the Pulmonary Artery in Identical Twins.** Gunter, J. U.: *Arch. Pathol.*, 1941, 31: 211.

Thrombosis of the main stems of the pulmonary artery is rare in children. The patients in whom death occurred only nine days apart were identical twin boys of fifteen months. Each



had had feeding difficulties in the last five months, which reflected themselves in marked reduction in weight, both twins weighing only 15 pounds. In the first twin to die, vomiting, fever and diarrhoea began 5 days before death. At autopsy there were large fresh thrombi in the right pulmonary stem, and also one in the left. On gross dissection of the ear no evidence of otitis media was present, but on microscopic section, an acute purulent infection of the middle ear was evident.

The second twin, who died nine days later, had had vomiting, fever, and diarrhoea for three weeks before death. Four days after the onset there was a left otitis media, and the drum was incised. About two weeks later a mastoidectomy was performed, and the child died with acute respiratory symptoms five hours after. There was a large fresh thrombus in the right pulmonary artery, which extended into practically every branch of the artery. Inasmuch as pulmonary artery thrombus is rare in children, and inasmuch as "the course of events in each of the present cases was entirely too similar and too unusual to be merely accidental", the author feels that their being identical twins had some rôle to play, although just what part heredity played in this case is by no means clear.

MADGE THURLOW MACKLIN

**The Effects of the Patent Ductus Arteriosus on the Circulation.** Eppinger, E. C. *et al.*: *J. Clin. Investigation*, 1941, 20: 127.

Studies of the circulation made on six patients before and after surgical closure of an uncomplicated patent ductus arteriosus showed that: (1) When the ductus arteriosus is open the blood flow is from the aorta to the pulmonary artery. (2) There is no blood flow from the pulmonary artery to the aorta. Therefore, these patients do not have arterial unsaturation and are not cyanotic. (3) The volume of blood flowing from the aorta to pulmonary artery varied from 4 to 19 litres per minute, which is 45 to 75 per cent of all the blood pumped into the aorta by the left ventricle. These flows occurred in patients with large ducti and under temporary conditions which are known to elevate the output of the heart. (4) The left ventricle expelled from 2 to 4 times the volume of blood expelled by the right ventricle in a given period of time. (5) Adjustment to the patent ductus may be made by an increase in the output of the left ventricle. If this is not sufficient to compensate completely for the leak through the ductus, there may be, in addition, a diminution in the blood flow to the periphery.

These studies of the circulation show the beneficial effects of operative closure of the ductus in

improving peripheral circulation in some patients and in reducing the work of the heart in all of them.

S. R. TOWNSEND

## Hygiene and Public Health

**Quantitative Studies of the Tuberculin Reaction.** Furcolow, M. I., Hewell, B., Nelson, W. E. and Palmer, C. E.: *Public Health Reports*, 1941, 56: 1082.

In the present study, using purified protein derivative (P.P.D.) as the antigen, the authors set out to test groups of individuals to graduated concentrations starting at 1/110 billionth of a mg. and continuing to 1 mg. Twelve different concentrations were used; those who reacted to a smaller dose of P.P.D. were not tested to the next higher concentration, as it was assumed that positive reactors to a small dose would certainly react to a larger one. The usual test concentrations of P.P.D. are: 0.00002 and 0.005 mg.

Several institutional groups were tested, namely: infants and young children in two foundling homes, children in an orphanage and in institutions for the care of tuberculous children, adults in a hospital for the treatment of active tuberculosis, and adults in an institution for the care of the insane. Nearly all the persons in these groups reacted positively to P.P.D. in high concentrations. In the case of babies under six months of age none of them reacted to the usual test doses of P.P.D., but 72 per cent reacted to 1 mg. Among the children aged six months to three years about 10 per cent reacted to the 0.005 mg. dose, 95 per cent to the 1 mg. dose.

Among the children in the orphanage (aged 6 to 19 years) 40 per cent of them with no history of contact with tuberculosis reacted to the 0.005 mg. dose; practically all, to the 1 mg. dose. Adults with known tuberculosis practically all reacted to the 0.005 mg. dose, 90 per cent of them to 0.00002 mg. dose.

The study seems to establish the fact that most people will react to tuberculin if a sufficiently strong concentration is used. It also seems to show that persons known to have tuberculosis or known to have had contact with tuberculosis in general react to very much smaller concentrations of the antigen than those who give no history of contact. It is shown, too, that age plays a part, for in babies a very large proportion require a strong dose of P.P.D. to produce a reaction, whereas a substantial number of older persons react to small dilutions even though no history of contact with tuberculosis is to be had. It is, of course, understood, that absence of history of contact does not mean absence of contact.

FRANK G. PEDLEY



## The War

### War Literature

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## Obituaries

**Dr. Herbert Huntington Banks** died at his home in Barrington Passage, Nova Scotia, August 5, 1941, not far from the scene of his birth, seventy-five years ago. A graduate of King's Collegiate School and Dalhousie, Dr. Banks took his medical degree from Harvard in 1889. Then he returned to his native village. For fifty years he served there, winning the confidence of many patients, the love of many friends. In 1939 he retired from active practice.

**Dr. John M. Brown**, Maysville, Mo., died on July 1st. He was born in 1857 and graduated in medicine from Trinity University, Toronto, in 1889.

**Dr. Harry Clarkson Cunningham**, veteran physician and pioneer resident of Carman, Man., died on July 3rd, after an illness of a few hours. Dr. Cunningham was one of the senior members of his profession present at the convention in Winnipeg of the Canadian Medical Association.

Born in Kingston, Ont., in 1864, he graduated in medicine from Queen's University at the early age of 21, coming west to Carman the next year.

Doctors were scarce in those pioneer days and Dr. Cunningham was away from his home days at a time, attending patients. It is doubtful if any Manitoba doctor had a wider territory. During the year of the 'flu epidemic he worked practically day and night, sleeping in a cutter or on the floor of some farm before visiting his next patient.

Except for the time he spent abroad taking a post-graduate course, he practised continuously at Carman. He was held in high esteem by his profession and was one of the examiners of graduates in medicine and surgery. On the 50th anniversary of his practice in Carman, he was honoured jointly by the municipality of Dufferin and the town and was presented with a silver plate at a ceremony in Memorial Hall.

Dr. Cunningham was a member of the Carman General Hospital Board since it was founded and in 1940 was made an honorary life member in recognition of his services. He was a member of the Masonic order for more than 50 years, holding the office of past master. He was connected, too, with the I.O.O.F., where he was also grand master. In politics he was a staunch Conservative. He served on the Carman school board for several years.

In 1896 he married Alice Meikle, of Carman, who survives him, as well as 2 daughters and a son, Dr. E. K. Cunningham, who also practises in Carman.

**Lt.-Col. J. Decarie** died after an illness of two years. A native of Montreal, he studied at the College Ste. Marie and at the University of Montreal where he received his medical degree in 1899. During the last war he was in command of No. 6 Laval Hospital Unit and was decorated with the Cross of the Legion of Honour. For several years he was in charge of the Provincial Government Department of Health for the Montreal district.

He was a brother of the late Judge L. J. Decarie. Besides his wife, he is survived by two sons, one daughter, and a brother.

**Dr. Charles John Edgar**, retired general practitioner, died at North Hatley, in his eightieth year. Dr. Edgar was well known in Montreal and district where he practised for many years. He was ill for several months.

Born at Sherrington and educated at McGill University, where he received his M.D. degree in 1891, Dr. Edgar served several other communities in his professional capacity, including Inverness, Lachine, Sherbrooke and North Hatley. He was a lieutenant in the Great War, returning with the rank of major.



**Dr. Russell E. Hartry** son of the late Mr. and Mrs. William Hartry, of Seaforth, Ont., died at Fort Frances, Ont., on August 7th. He was a graduate of the University of Toronto of 1914.

**Dr. Lionel Hutson** died at Bridgetown, Barbados, British West Indies. Dr. Hutson was in his fifty-first year. His wife is a daughter of Archdeacon C. and Mrs. Saddington, of Port Credit, Ont. Well known to the medical fraternity of Toronto and Montreal, Dr. Hutson was a graduate of Dalhousie University (1916). He had charge of a large medical practice in Barbados with which his father, who was also a doctor, was formerly associated. He was a veteran of the first Great War.

Surviving are his widow, three daughters and one son.

**Dr. Wm. J. Logie**, of Brantford, Ont., died in his eighty-second year. He was a graduate of Victoria University in 1886. Dr. Logie is survived by two daughters.

**Dr. M. A. Macaulay**, commanding officer of Camp Hill Hospital and member of the Halifax Board of School Commissioners died after a brief illness. Though he had not enjoyed good health for many months, his sudden passing was unexpected and came as a serious shock to his family and friends.

Dr. Macaulay who had a distinguished record overseas in the last war, and a long and successful career in Halifax, was one of the best known and most highly esteemed men in the province.

He was born 60 years ago in Glace Bay, son of the late Peter and Charlotte Harold Macaulay. He was a graduate of Pictou Academy and Dalhousie University and did post-graduate work at Bellevue Hospital, New York. At the conclusion of his studies he began practice in Halifax.

A man of forceful personality, keen humour and great kindness Dr. Macaulay had the implicit trust of his patients and the affection of innumerable friends throughout Nova Scotia.

Though he left his native town many years ago he was always a true son of Cape Breton. He was familiar with Gaelic and knew many songs in that language.

Early in the First World War Dr. Macaulay went overseas with the No. 7 Stationary Hospital, organized in Halifax, headed by the late Col. John Stewart and known as the Dalhousie Unit. He went to France in 1916 and served with medical and hospital units under fire at the front lines. Following his transfer from the Dalhousie Unit he served with several other Field Ambulance Units.

Returning to Halifax in 1918 he was Commanding Officer at Cogswell Street Hospital for a year and upon demobilization joined the staff of Camp Hill where he became superintendent. Later he was appointed District Administrator for Nova Scotia and Prince Edward Island. At the time of his death he was Commanding Officer at Camp Hill.

Thousands of casualties came under his supervision during his periods of office. Twice he had the privilege of greeting royalty, at the hospital, the Prince of Wales in 1920 and King George VI and Queen Elizabeth in 1939. He was an officer of St. David's Church and one of those who were instrumental in founding it after church union.

He was appointed a School Commissioner in November, 1939, his second such appointment. He was on the Board about 1914 but left to go overseas before his term of office had expired.

Dr. Macaulay is survived by his wife, two daughters, two granddaughters, three sisters, and three brothers.

**Dr. John Purney**, of New Britain, Conn., died at Shelburne, N.S., July 18, 1941. He was a son of the late Dr. John Purney, of Shelburne, and for some

years of his early life taught school in his native county. He was 62 years of age and a graduate of Maryland University (1906).

**Dr. Allan B. Rutherford**, prominent Owen Sound physician and chief coroner for Grey County, died suddenly at his home on August 7th following a two-day illness.

Born in Owen Sound on August 31, 1873, he was the seventh son of pioneer parents, the late John Rutherford, former county clerk, and Sophia Ann Miller. He was educated in the city's public schools, Collegiate Institute and Model School. After graduating from the University of Toronto in 1901, and serving for two years in the Sick Children's Hospital and the Toronto General Hospital, Dr. Rutherford returned to his home city and opened up a practice.

For thirty-seven years he has been an esteemed member of the local medical fraternity and an indefatigable worker in underprivileged children's service. As a Rotarian he found an outlet for his love of children and the work of the local organization has been enlarged and augmented by his efforts. He was responsible for the establishment of the children's welfare clinic in Owen Sound.

Prior to his recent appointment as Chief Coroner for the county, Dr. Rutherford served as coroner for over twenty years and was Medical Health Officer for the townships of Derby and Sarawak. He was a member of the Board of Education for nearly twenty years.

He was a Conservative and a member of Division Street United Church, and of the Independent Order of Foresters and the Royal Arcanum. He was an ardent bowler and golfer, these sports superseding his former interest in football and cycling.

Besides his widow, the former Audrey Lemon, surviving are three daughters and a sister.

**Dr. George Alexander Smith** for 35 years a physical director for the Y.M.C.A. in Toronto, Vancouver and Montreal, died suddenly on August 2nd at the age of fifty-nine.

He had been interested in physical education at the Y.M.C.A. before entering university and, after completing his medical course, devoted his life to the work. He was born in Hamilton and attended the University of Western Ontario at London. He joined the 13th Field Ambulance and went overseas in 1915 attached to the 47th Battalion. He won the Military Cross twice.

After the war he was sent to Vancouver as physical director of the Y.M.C.A. Later he was transferred to Montreal and then to Toronto.

Surviving are his widow, four sisters, and one brother.

**Dr. Walter H. Smyth**, a life-long medical practitioner in Montreal, died on July 26th in the western division of the Montreal General Hospital. He was sixty-eight years of age.

Dr. Smyth had been active in his professional duties, including service on the Military Examining Board, until a short time ago, when he took ill. He had been attached for years to the Montreal General and Western Hospitals. For a time he lectured on anatomy and surgery at McGill University. He was also a doctor for the Montreal Tramways Company. He was a lieutenant-colonel of the Canadian Army Medical Corps.

Son of the late Rev. William J. and Sarah (Bagshaw) Smyth, Dr. Smyth received his early education in the public schools of Oshawa, Ont., where he was born. He completed his secondary schooling at Montreal High School and then entered McGill University, from which he graduated with the degrees of B.A., M.D., C.M. in 1896.

Dr. Smyth had been an elder of St. Andrew's Church, Westmount, for the last 28 years. He was a member of the Heather Curling Club, Lanthier Fish-

ing Club and was one of the charter members of the Kanawaki Golf Club.

Survivors include Mrs. Smyth, widow, the former Elizabeth Boon; one daughter, one son, a brother, one sister, an aunt, and four grandchildren.

#### AN APPRECIATION

Walter Smyth's passing has left a peculiarly keen regret. It is true he had not been well for some time; the inexorable changes of arteriosclerosis were all too evident. But even so it was a shock to know that he would no longer be among us, with his brusque but genial manner.

The list of his clubs and other occupations tells us how full his life was, but if I were to choose only one of them, to show the kind of man he was, it would be his fishing. Every fishing club has its president and its secretary, and while in camp someone is usually recognized as the leading spirit. But not often does one find all these rôles so completely combined in the one man as they were in Walter Smyth. He held sway in his camp at Lanthier with absolute certainty and complete absence of effort, and it was chiefly due to his unselfishness. Himself a keen and accomplished fisherman, he would spend hours of his precious holiday time seeing that things were comfortable for everyone else. If one didn't go to bed overfed it was not his fault. The more crowded the table the greater was his pleasure. He loved a good story and had some himself which it became customary to demand of him every year, and his delight in them never lessened.

He had the guilelessness of a child in some things, and yet along with it very sound commonsense and the sturdiness of a man. Surely will he be missed from among us.

H. E. MACDERMOT

Dr. Thomas Herbert Sneath, Durham, Ont., one of the best-known practising physicians in this district for nearly half a century, died from a heart attack on May 29th. He had made his regular calls on Monday and was taken ill later in the afternoon. From the first his condition was regarded as most serious and a specialist was brought from Toronto, but the attack proved fatal.

Dr. Sneath was in his 74th year, having been born at Midhurst on March 2, 1868, a son of the late Mr. and Mrs. George Sneath. He received his early education at Midhurst, later attended the Collegiate at Barrie, and was a graduate of Trinity Medical College, Toronto, in 1895. He commenced practice at Dromore in 1896, where he remained until 1930, when he came to Durham. He had a long and brilliant medical career and was held in the very highest esteem by all who knew him, and his friends in Egremont, Durham and elsewhere were numerous.

Of a retiring disposition, Dr. Sneath nevertheless took a deep interest in his community. He was a Liberal in politics, and actively connected with the party locally, being president of the South Grey Liberal Association at the time of his death. He had on different occasions been requested to be his party's candidate in both the Legislature and the House of Commons, but declined this honour.

For a number of years he was a member of the Durham High School Board, being appointed by the county, and for two years was chairman of the Board. For many years Dr. Sneath was medical officer of health for Egremont, and for some months, since Dr. Burnett joined up with the R.C.A.F. filled the same position for Durham. He was also medical officer of health for Glenelg township.

Dr. Sneath was president of the Durham Lawn Bowling Association and one of its most enthusiastic members. Fraternally, he was a member of St. Alban's Lodge A.F. & A.M., Mt. Forest, and Durham Chapter No. 221, Royal Arch Masons. He was a member of Durham Presbyterian Church.

Dr. Sneath was married two and a half years ago to Miss Agnes Renwick of Durham, who survives. Surviving also are one brother and two sisters.

## News Items

### Alberta

The solicitor and secretary of the Workmen's Compensation Board met the Council of the College of Physicians and Surgeons, when a general discussion took place regarding misunderstandings between the profession and the Board. One question under discussion was the responsibility of a doctor who has a general mine contract to do the work of a specialist or pay for the cost of transportation and treatment when the injured workman is sent out of the mining camp. Another question that is causing uneasiness among physicians is the delay in accepting cases by the Board where the injured workmen failed to report the accident to the industry the day it happened.

Owing to the fact that a large number of men have moved out of the dry areas, with the consequent result that in some districts there is a very small medical vote, the Council appointed a special committee to look into the matter and make a written recommendation to the next meeting.

The question of establishing a benevolent fund to assist the British doctors who through war have suffered financially and otherwise is being referred to the members of the Alberta profession at the September convention. At present there are no funds available for such a contribution. It is felt, however, that individual members would avail themselves of an opportunity to contribute when the facts were presented.

The questions of gasoline regulations was up for discussion owing to the fact that in sparsely settled areas, with long distances to travel, the doctors are caught with a shortage of gasoline and unable to make the necessary calls. There is a feeling that some special regulation should be made so that all emergency calls may be made without delay. The matter has been referred to the Canadian Medical Association.

As the 1942 meeting of the Canadian Medical Association is to be held at Jasper Lodge, at which time both the British Columbia and the Alberta Provincial Associations will hold their annual meetings, a special committee has been set up and is already at work in an effort to make this Convention the most successful one ever had in the West. The Canadian National Hotel will be opened earlier for the special occasion and be used exclusively for the members of the convention. The committee is considering the question of a scientific program of four hours in the forenoon with an afternoon free for the members of the convention to enjoy the wonders of the Rockies. Provision will be made for afternoon programs in case weather does not lend itself for outdoor activities. The committee is most enthusiastic and is anticipating a splendid meeting.

Dr. R. B. Francis, President of the College of Physicians, and Dr. George R. Johnson, Registrar, have been elected representatives on the Medical Council of Canada.

Dr. S. M. Rose, Lethbridge, the newly elected member for that district on the Council of the College of Physicians and Surgeons of Alberta, took his seat on the Council for the first time early in August, 1941.

Dr. J. W. Scott, Edmonton, has been elected as alternate member of the Executive Committee of the Council of the Canadian Medical Association.

Dr. H. E. Duggan, of Red Deer, has just joined the R.C.A.M.C., thus creating a vacancy with Dr. Bunn at Red Deer.



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Dr. Thomas Merton Dyer, of Edam, Saskatchewan, is moving to Edmonton to take over the practice of Dr. T. E. Corbett.

Dr. George Gushue-Taylor, a graduate of London University, England, has moved to Bonnyville. He formerly practised medicine in Formosa.

Dr. Frederick Newman Sparling, of Winnipeg, is now with the Medicine Hat Clinic.

Dr. William Robert Bell, a graduate of Alberta University (1941), is now taking his senior internship in the Lamont Hospital under Drs. Archer and Young.

Dr. Francis B. Jordan, of Drumheller, who has been doing post-graduate work since his graduation in 1937, in Edmonton, has returned home to practise.

Dr. George F. Casper has opened up an office in Peace River.

Dr. G. M. Gibson, of Drumheller, has retired from practice and has moved to Balfour, B.C.

G. E. LEARMONTH

### Manitoba

The poliomyelitis epidemic shows no signs of abating. At the time of writing 314 cases have been reported, with three deaths in Winnipeg. Fortunately the disease is mild for the most part, although there have been occasional deaths. Dr. Gudakunst of New York, Medical Director of the United States National Foundation for Infantile Paralysis, whose advice was sought by the Minister of Health and Public Welfare and who discussed methods of prevention and treatment with a special advisory board has returned to New York, and Dr. J. D. Adamson, Professor of Medicine has been appointed by the Ministry of Health and Public Welfare to be consultant. Cases of the disease have been reported all over the province although the incidence is greatest in Winnipeg.

There is a shortage of nurses owing to several causes and the Manitoba Association of Registered Nurses has issued an appeal to all registered nurses to state whether they are available for duty.

Seventeen cases of encephalitis with two deaths have been reported in Manitoba. So far the disease has been confined to southern Manitoba with the heaviest toll at Winkler where there have been five cases. It would appear that the source of these cases is Minnesota, where a total of 366 cases have been reported with 29 deaths. In type the disease is said to resemble that found in the St. Louis epidemic.

The total of poliomyelitis cases reported is now 398 with the outbreak most prevalent along the Red River valley. In Winnipeg there have been 140 cases and more than half the total to date have occurred in Greater Winnipeg. All theatres and public gatherings in Transcona have been barred to children under sixteen years of age. The health officer of Pine Falls has placed a quarantine on the town in the hope of preventing infection reaching it.

Lieut. Herbert Meltzer, R.C.A.M.C., formerly surgeon at Manitoba Sanatorium, Ninette, is now at Lansdowne Park, Ottawa. Dr. A. L. Paine has taken over the surgical services at the Sanatorium.

Dr. Elizabeth B. Akhurst, of Victoria, B.C., who has recently been on resident staff of the Vancouver General Hospital, has joined the Sanatorium staff on July 10th. Dr. J. M. Sigvaldason, who has been in private practice at Shoal Lake, joined the staff late in July.

The City Council has unanimously decided to amalgamate the health services of the city and the school board. It is a logical move and one that should

result in improved efficiency of operation, which means that it will give better service to the public.

Under the old system no special attention was given to children until they became pupils in the public schools. On enrolment it was frequently discovered that children were suffering from physical ills and disabilities of one sort or another which might have been easily remedied if they had been attended to earlier but which had become more difficult by reason of delay.

Under the new arrangement children of pre-school age will be watched and given such medical care as may be needed in order that they may start school in the enjoyment of sound health and in the best condition to get the fullest benefit out of their school years.

ROSS MITCHELL

### New Brunswick

There is at present a considerable epidemic of infantile paralysis in New Brunswick, largely centred in the middle portion of the province. There have been three deaths up to August 1st.

Dr. O. C. McIntosh, recently resident physician at the Saint John General Hospital, has been appointed to a Fellowship in the Banting Institute, Toronto.

Dr. Thomas Laidlaw and Dr. T. S. Douggan have recently begun practice in Sussex, N.B. Dr. Hazen Mitchell, who practised in Cape Breton, has moved to Harvey Station, N.B.

Captain J. P. (Bud) McInerney, serving with the R.C.A.M.C. in England, has been promoted to the rank of major.

Dr. George W. Skinner has been notified of his appointment to active membership in the American Association of Thoracic Surgeons. At the last meeting of the Association Dr. Skinner reported 236 cases of thoracoplasty in cases of tuberculosis.

Dr. A. T. Leatherbarrow, of Hampton, has been elected to associate membership in the American College of Physicians.

A. STANLEY KIRKLAND

### Nova Scotia

Directed by Dalhousie Physiologist C. B. Weld, and spurred on by the visit of Dr. C. H. Best, the Halifax blood bank system is developing satisfactorily.

Dr. Clyde S. Marshall (Dal. '24), for the past ten years a member of the faculty of Yale Medical School, has opened an office in Halifax where he will be associated with his brother, Dr. A. M. Marshall.

Halifax obstetricians scanned with mixed feelings figures of new births for the first seven months of 1941 and found them greater than the 1940 year's total, an all time high city record.

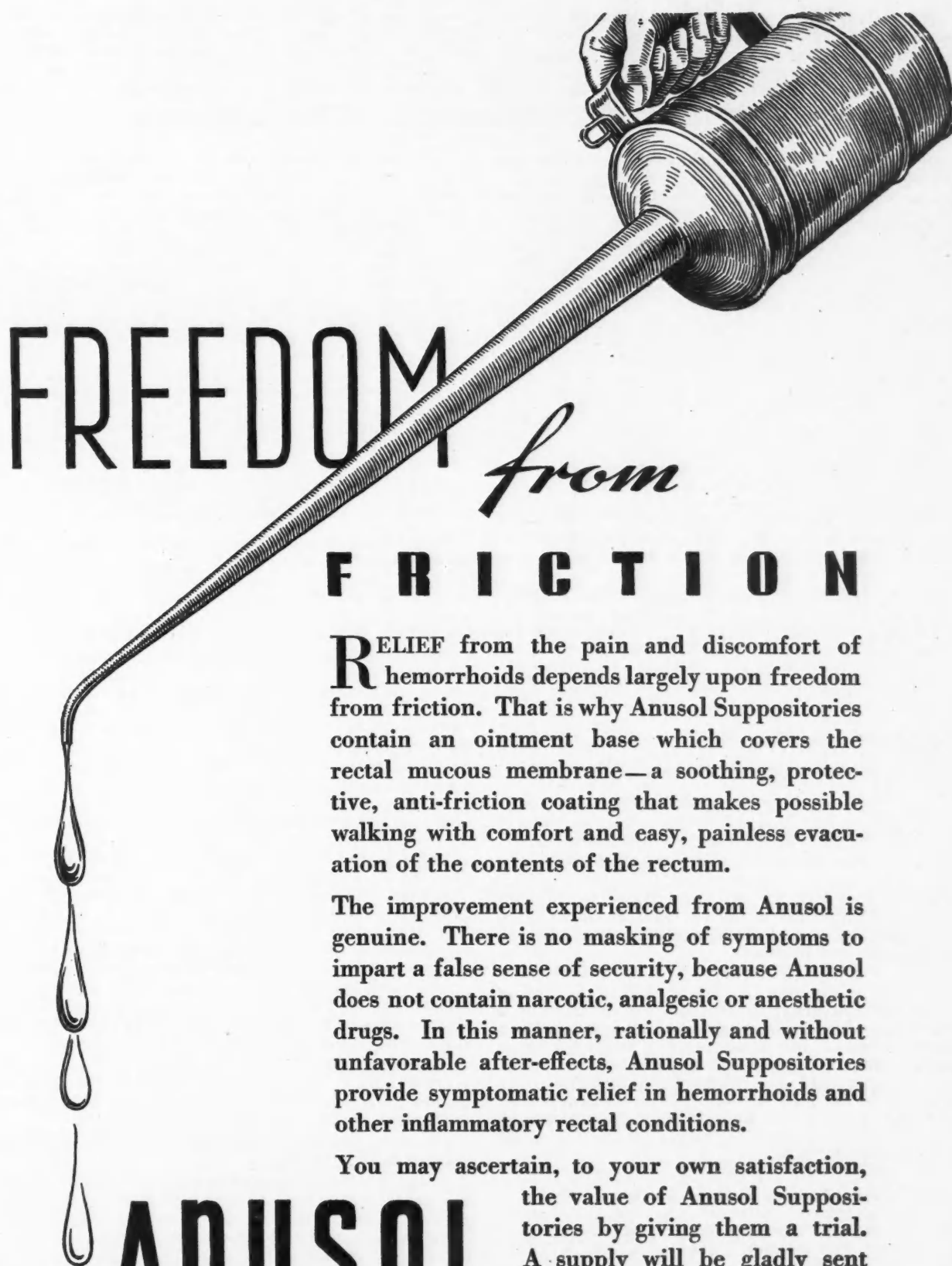
ARTHUR L. MURPHY

### Ontario

The Windsor Metropolitan General Hospital in July adopted a six day week for its entire permanent staff and is believed to be the first hospital in Ontario to take this step.

United Church Headquarters announce that Dr. Robert B. McClure has arrived at Hong Kong en route to the Burma Road where he will take up his new duties as director in charge of an ambulance unit provided by the Quakers of Great Britain and the United States.





## F R I C T I O N

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SUPPOSITORIES

**WILLIAM R. WARNER & CO., LTD., 727 King Street, West - Toronto, Ont.**

The University of Western Ontario announces that with the commencement of the fall term August 25th the tuition fees for second to fifth year students in medicine will be increased from \$250.00 to \$312.50. This has been found necessary because of the salaries and facilities which must be provided to complete a six year course in five years.

Dr. W. R. Crowe, of Minden, Ont., who has been serving with the Middle East forces, is reported a prisoner of war in Germany having been captured during the Battle of Crete.

The Department of Physiology of the University of Toronto has received a grant of \$9,000 from the Rockefeller Institute in recognition of its work on vitamins. Professor E. W. McHenry and his associates in the University now form a separate department of nutrition. Notice has been taken of a survey by this department of the food used by teen-aged girls in Toronto from which has been learned there are a number of deficiencies in their ordinary diet.

The many friends of Colonel A. E. Snell, R.C.A.M.C., will be pleased to note his appointment as Assistant Director of Medical Services in the Inspection Branch of the Royal Canadian Army Medical Corps.

A Military Hospital is being opened in Hamilton with approximately 185 beds, with Colonel D. P. Kappele, D.S.O. and Bar, as Officer Commanding.

To the Toronto Military Hospital have been attached Dr. Sheldon Hazan, formerly of the Ontario Department of Health, and Dr. J. J. Weber of the Tuberculosis Prevention Division. Captain J. A. C. Thomson, Chief in Medicine, has been transferred to the 16th Field Ambulance Corps now at Niagara-on-the-Lake.

Major W. C. Morgan, Belleville, has been transferred from the staff of the Brockville Military Hospital to the Rideau Military Hospital, Ottawa.

Dr. Paul B. Hamilton, of Toronto, who has been a Fellow at the Rockefeller Institute for Medical Research, has been advanced to the post of Assistant.

*Science* for July 4, page 11, carries an obituary notice of Charles Lloyd Connor who, in 1926, acted as Director of the Pathological Laboratory of the Montreal General Hospital.

To meet the urgent need for civilian and army doctors, the University of Toronto Medical Faculty is doing away with the lengthy course in Biological and Medical Sciences and substituting a shorter medical course. The Biological and Medical course lasted four years leading to a degree in Arts followed by four years in the medical course. The Medical School opened on August 25th for all years other than the first, for which registration begins at the usual time, September 22nd.

Nearly 100 members of the Academy of Medicine of Western Ontario attended the annual summer gathering and golf tournament at the St. Thomas Golf and Country Club's Union course on Wednesday, July 23rd. This was the first time the tournament has been held outside of London. J. H. ELLIOTT

### Quebec

Une déclaration récente du Dr Emile Martel, médecin hygiéniste régional des territoires de colonisation nous apprend que la typhoïde et la diphtérie ont complètement disparu des régions de colonisation, notamment en Abitibi et au Témiscamingue. Les chiffres publiés pour 1939 rendent bien compte du travail accompli: diphtérie, 2,434 injections d'anatoxine à 944 personnes, dont 774 ont reçu leur certificat; typhoïde, 4,194 injections de vaccin à 1,730 personnes et 1,323 vaccinations complémentaires; variole, 644 enfants vaccinés.

Extrait du discours du Dr John Grégoire, sous-ministre de la Santé à Québec, au Congrès des hygiénistes du Canada: "Dans notre seule province plus de 1,200 municipalités sont privées de médecin." Cette effarante situation a fait l'objet d'un éditorial du doyen LeSage dans *l'Union Médicale*. On ne saurait trop souligner cette pénurie ou encore cette distribution mal comprise des praticiens. La situation mérite qu'on l'étudie sérieusement et que chacun apporte ses suggestions dans des lettres ouvertes aux divers périodiques médicaux du Pays.

On a dévoilé le 3 août dernier aux "Camps de santé" Bruchési sur les bords du Lac l'Achigan une plaque commémorative à la mémoire du Dr J. E. Dubé, fondateur de l'œuvre. JEAN SAUCIER

### United States

**Inter-State Postgraduate Medical Association of North America.**—This year's International Assembly will be held in the public auditorium, Minneapolis, Minn., October 13th to 17th. The unusual clinical facilities of its hospitals, and excellent hotel accommodations, make this city an ideal meeting place.

The Hennepin County Medical Society will be host to the Assembly. The officers of the Inter-State Postgraduate Medical Association, those of the Hennepin County Medical Society and the Minnesota State Medical Association, extend a very cordial invitation to all members of the profession in good standing to attend the Assembly. A very excellent program is being arranged for the ladies.

A full program of scientific and clinical sessions will take place each day and evening of the Assembly, starting at 8.00 a.m. In co-operation with the Hennepin County Medical Society, the Minnesota State Medical Association and the Minneapolis Civic and Commerce Association, an intensive week of postgraduate medical instruction is offered by in the neighbourhood of eighty-five distinguished teachers and clinicians from different parts of the United States and Canada who are contributing to the program.

Pre-assembly and post-assembly clinics will be conducted, free of charge, in the Minneapolis hospitals on the Saturdays previous to and following the Assembly, for visiting members of the profession.

Scientific and commercial exhibits will be an important part of the Assembly and will be open to members of the profession in good standing without paying the registration fee.

The registration fee for the scientific and clinical sessions will be \$5.00.

A list of distinguished teachers and clinicians who are to take part in the program will be found on page lx of the advertising section of this *Journal*.

Dr. Roscoe R. Graham, President, Toronto, Can.; Dr. George W. Crile, Chairman, Program Committee, Cleveland, Ohio.; Dr. William B. Peck, Managing-Director; Dr. Berton J. Branton, President, Minnesota State Medical Association, Willmar, Minn.; Dr. Benjamin B. Souster, Secretary, Minnesota State Medical Association, St. Paul, Minn.; Dr. Russell W. Morse, President, Hennepin County Medical Society, Minneapolis, Minn.; Dr. Lewis M. Daniel, Secretary, Hennepin County Medical Society, Minneapolis, Minn.; Dr. Charles E. Proshek, General Chairman, Minneapolis Committees, Minneapolis, Minn.



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## Book Reviews

**The Health and Efficiency of Munition Workers.** H. M. Vernon. 138 pp. \$2.50. McAinish, Toronto, 1941.

The excellence of this book much surpasses any anticipations which its small size would evoke. Likewise, it covers much more ground than its title would suggest. Its author, a medical man, was formerly Investigator for the Health of Munitions Workers Committee and for the Industrial Health Research Board, in Great Britain, and therefore can speak with authority. His subject is of paramount importance in war time and of little less moment in time of peace. He tells us how, by attention to certain details, to obtain the greatest degree of production of materials, while at the same time conserving the health of the operatives. The subjects dealt with are Hours of Work, Work Spells and Rest Pauses, Shift Systems, Sickness and Absenteeism, Accidents and Injuries, The Ventilation, Heating and Lighting of Factories, and Welfare and Labour Management. The book contains many tables of figures obtained by thorough investigation, from which the author's conclusions are deduced. Few people, with the best of zeal and intentions, can readily obtain for themselves the information contained here, much of which is buried in various reports. The marrow of the not inconsiderable amount of research that has been undertaken in the subject since the period of the last Great War can be found in this work, logically treated, and well systematized. The book is heartily commended to the attention of all employers of labour and to medical men interested in the industrial aspects of medicine.

**Artificial Pneumothorax in Pulmonary Tuberculosis.** T. G. Heaton. 217 pp. \$2.50. Macmillan, Toronto, 1941.

The author has attempted in this volume to bring together the best of present-day knowledge of pneumothorax therapy and to present the same in such a way that it will be useful to physicians everywhere. After giving an interesting and accurate account of the history of pneumothorax therapy he devotes several chapters to the physiology and pathology of pneumothorax. Dr. Heaton's views on the mode of action of pneumothorax differ from those of most observers in that he attributes selective collapse of the diseased portion of a lung to the recoil of elastic tissue rather than to the retraction of fibrous tissue and he thinks that bronchial occlusion plays an important part in the production of fibrous tissue in collapsed lungs. His presentation of the clinical aspects of pneumothorax is unusual in that it begins with a discussion of the complications of pneumothorax and then takes up the indications for pneumothorax therapy and the technique and management of pneumothorax therapy. He favours induction of pneumothorax at an early stage in patients with unilateral tuberculosis and positive sputum. The sections devoted to the technique and management of pneumothorax, bilateral pneumothorax, and ambulatory pneumothorax should prove most useful to anyone who is called upon to carry on pneumothorax therapy. The final chapters contain a brief account of the essential features in the management of extrapleural pneumothorax and some comments on the rôle of oleothorax in the treatment of pulmonary tuberculosis.

**Essentials of Endocrinology.** A. Grollman. 480 pp., illust. \$7.50. Lippincott, Montreal, 1941.

The rapid progress of endocrinology and the ever increasing avalanche of publications in this field are making it difficult for the average medical reader, who requires a condensed survey, yet broad enough to familiarize himself with the extent of the subject. This book brings together the entire subject matter dealing with the hormones. The amount of information crowded into this text, is enhanced by lucidity

in the presentation of the material, none of which has been sacrificed for the sake of compactness.

This volume is divided into five parts. The analysis of the concept of endocrinology, with its history, origin, and evolution, and the methods of administering the hormones are given in the preface. Part one deals with the endocrine glands of the cranial cavity. The gross anatomy, histology, physiology, and diseases are clearly presented, and at the end of each chapter important references are given. Part two treats of the branchiogenic organs. The chapter on the thyroid gland is excellently presented and well illustrated. While the clinical aspect is short, it is clear and to the point. In part three, the endocrine organs of the abdominal cavity are presented. Here, too, the author reviews the tissue of the pancreas, describes insulin, its mechanism of action, and uses; treats diabetes mellitus very clearly, and its complications briefly, but accurately; hyperinsulinism, the pathology of the adrenal glands, and the diseases of the adrenals are clearly dealt with. Part four deals with the hormones of the reproductive organs. Here, a general biology of the sex, the male reproductive system and its clinical considerations, the female reproductive system, and the hormones associated with reproduction in the female and its endocrine relations, are to the point, concise, but clear. The therapeutic uses of the female sex hormones, and the commercially available hormones are described. The final chapter treats hormones derived from non-endocrine organs. This chapter is very brief, and superficially treats the hormones of the gastrointestinal tract, and other presumptive hormones from non-endocrine organs.

**Essentials of Dermatology.** N. Tobias. 478 pp., illust. \$5.75. Lippincott, Montreal, 1941.

The aim which the author of this small book had before him was ambitious and it is worth while giving it in his own words quoted from the preface: "the idea of placing a handy volume at the disposal of general practitioners and medical students . . . to present the growing subject of dermatology completely and concisely without the sacrifice of detail." The degree of success to which he has attained is astonishing. Within the compass of 478 pages, printed in large clear type, he has covered the ground thoroughly, not only including the common dermatoses but the rare ones as well.

The accomplishment has been made possible in large part by omission of bibliography, foot-notes, historical notices, and more than the briefest histopathological descriptions. What he has to say is said without verbiage, and most of it is very much to the point. His clinical descriptions are for the most part excellent. The author's personal viewpoint and background of experience is evident to a degree that removes the book from the classification of compendiums. While there has been no descent to the telegraphic style, the construction is occasionally loose, with resultant ambiguity. For instance in discussing lupus erythematosus it is advised to take "a chest x-ray plate and blood count to eliminate pyogenic and tuberculous foci." Surely foci are not so easily eliminated, and the meaning although deducible might have been better expressed. Once or twice "flexors" is used where the word should have been "flexures".

A necessary result perhaps of the compression of material has been an occasional noticeable dogmatism. The quality of the illustrations, of which there is necessarily a limited number, is, as in most dermatological texts, variable. Some, such as those of atopic dermatitis, linear keloid and squamous-cell carcinoma of the lip, are excellent; others are downright bad. The pictures of erysipelas, erythema and ecthyma are ill-chosen and it is doubtful if any dermatologist could guess what they are intended to represent.

There is no doubt that this book is a veritable *multum in parvo*, and can be referred to with profit by any of the audience for which it has been designed.